

SCIENCE

TECHNOLOGY

**STEM**

2022 STEM EDUCATION REPORT CARD

Washington State  
STEM Education Innovation Alliance

ENGINEERING

MATHEMATICS



## ***INSIDE THIS REPORT***

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# Washington STEM Education Innovation Alliance

## 2021 STEM Year in Review

### Executive Summary

#### Washington's STEM Challenge

A strong education continuum in all phases is critical to students' academic progress and long-term career success. We are making progress in some areas, but more work is required to advance in others. Two key factors for advancing STEM education are:

- **Progressive Readiness.** Students' academic preparation and readiness for success at each level needs to be a clear focus, beginning with early education, as they progress from preK-12 to postsecondary education and careers.
- **Equity.** Equitable opportunities and access to STEM programs and student supports need to be expanded to promote academic progress and persistence.

#### Early Learning

- Students who have demonstrated 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.
- However, readiness is not evenly spread across racial, ethnic, and income groups. Expansion of the EARLY CHILDHOOD EDUCATION AND ASSISTANCE PROGRAM (ECEAP) could help students from historically underrepresented populations begin their education trajectories with the skills they need to succeed.

#### K-12 Education

- The percentage of low-income, American Indian/Alaskan Native, African American, and Hispanic/Latinx students meeting Smarter Balanced learning standards in math and science remain relatively low.
- The data also show a decline, across all demographic groups, in the number of students meeting standard in math and science, as they progress through successive grades.

#### College Readiness

- In 2020, Washington students consistently outperformed national averages for AP exam pass rates in nine STEM subjects.
- Scores on these tests are a good measure of a student's preparedness to engage in college level studies.
- However, there is wide disparity in AP exam performance and participation across various demographic groups.
- Expanded efforts are needed to support students from these groups to engage in STEM, enroll in AP and other dual credit courses, and succeed in postsecondary studies.

#### Student Interest in STEM

- 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.
- The percentage interested in a STEM major rose from 25 percent in 2010–11 to 35 percent in 2020–21.

#### The STEM Gender Gap

- Girls and boys tend to begin school with comparable math and cognitive skills, and girls tend to score as well or higher than boys on K-12 assessments in math and science.
- However, as they advance in their education, female students tend to be less likely to participate in certain AP STEM courses, such as a computer science and physics, and less likely to complete STEM degrees.

#### Postsecondary Education and Workforce Alignment

- STEM degree completions are increasing overall.
- STEM degrees in Washington, as a percentage of all degrees completed, exceed the national average at the bachelor's and graduate levels.
- But even with these increases, rapidly growing workforce demand is still outpacing STEM degree production in many occupational fields and remains a challenge.

# Washington STEM Challenge

## Advancing Equity in STEM Education to Expand Opportunities and Meet the Demands of Our Innovation Economy

### Early Learning

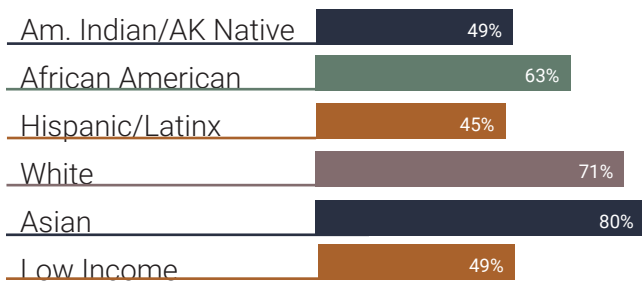
Kindergarten readiness is improving but more effort is needed to continue advancement in this critical area. Students who have demonstrated kindergarten readiness in math, literacy, and four other developmental areas are more likely to meet standards in math and English language arts assessments in 3rd grade and beyond.

In 2019–20, 51.5% percent of students were kindergarten ready in all six developmental and learning areas, up from 45.7 percent the year before.<sup>1</sup>

About 68% of incoming kindergarteners demonstrated “kindergarten readiness” in math among students assessed by WaKIDS in 2019–20, 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.

#### KINDERGARTEN READINESS IN MATH BY RACE/ETHNICITY AND INCOME, 2019–20<sup>2</sup>



Expanded opportunities for early learning support programs, such as The EARLY CHILDHOOD EDUCATION AND ASSISTANCE PROGRAM (ECEAP), could help improve these results. This is a prekindergarten program that provides comprehensive education, health and family support services to the most vulnerable of Washington’s young children. Children who participate in ECEAP are more likely than others from low-income families to be kindergarten ready, and the benefits of ECEAP extend well beyond kindergarten.<sup>3</sup>

When compared to similar non-participants, children who participate in ECEAP outperform their peers in grades even five or six years later.

### K–12 Education

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

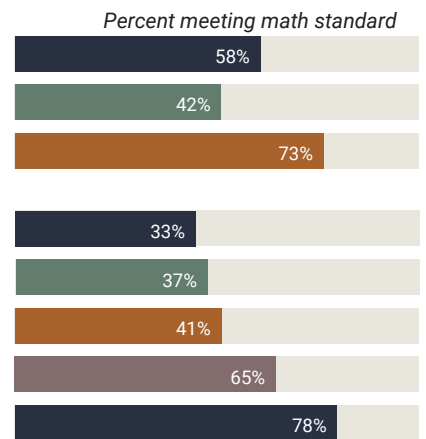
The percentage of low-income, American Indian/Alaskan Native, African American, and Hispanic/Latinx students meeting Smarter Balanced learning standards in math and science remain relatively low. The data also show a decline, across all demographic groups, in the number of students meeting standard in math and science, as they progress through successive grades. 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.

#### SBA SCORES, 2019<sup>4</sup>

##### 3RD-GRADE MATH

All Students  
Low Income  
Non-Low Income

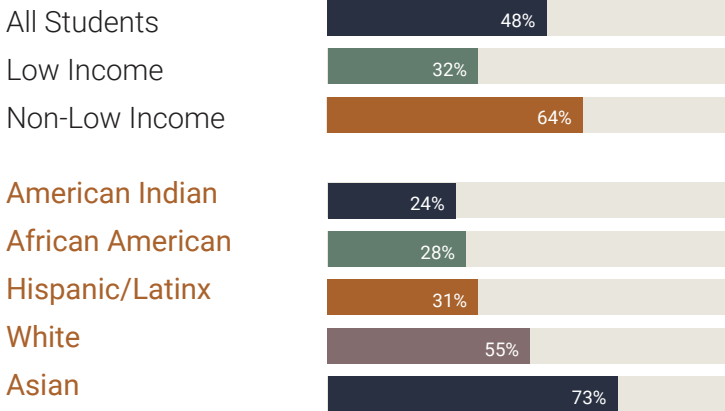
American Indian  
African American  
Hispanic/Latinx  
White  
Asian



## SBA SCORES, 2019<sup>4</sup> Continued

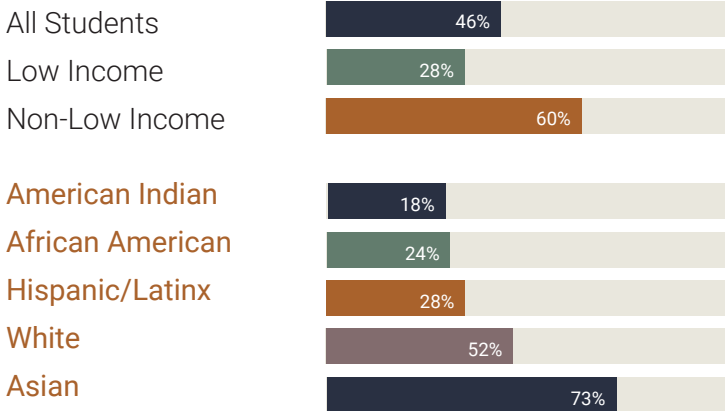
### 5th-GRADE MATH

Percent meeting math standard



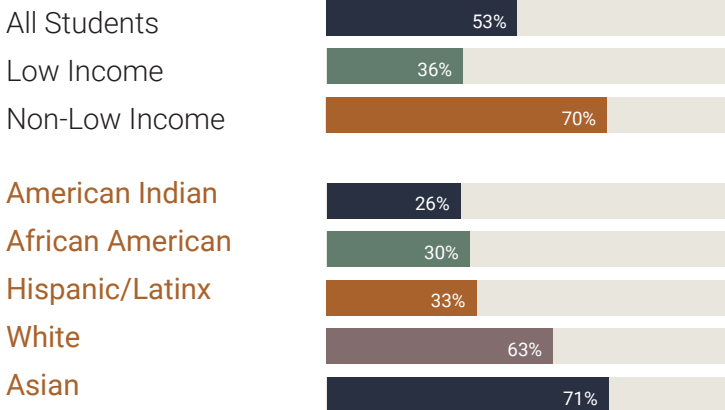
### 8th-GRADE MATH

Percent meeting math standard



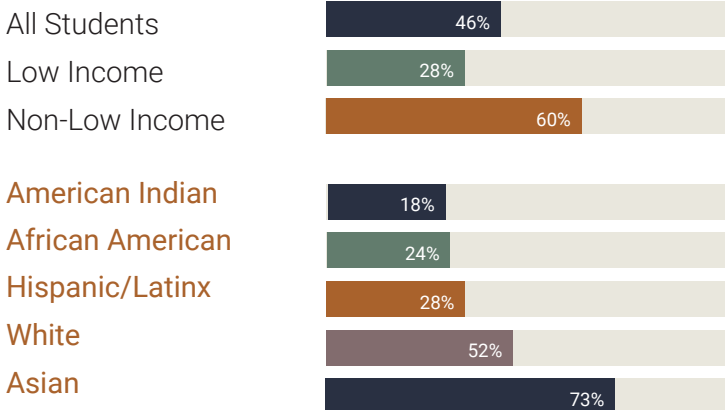
### 5th-GRADE SCIENCE

Percent meeting math standard



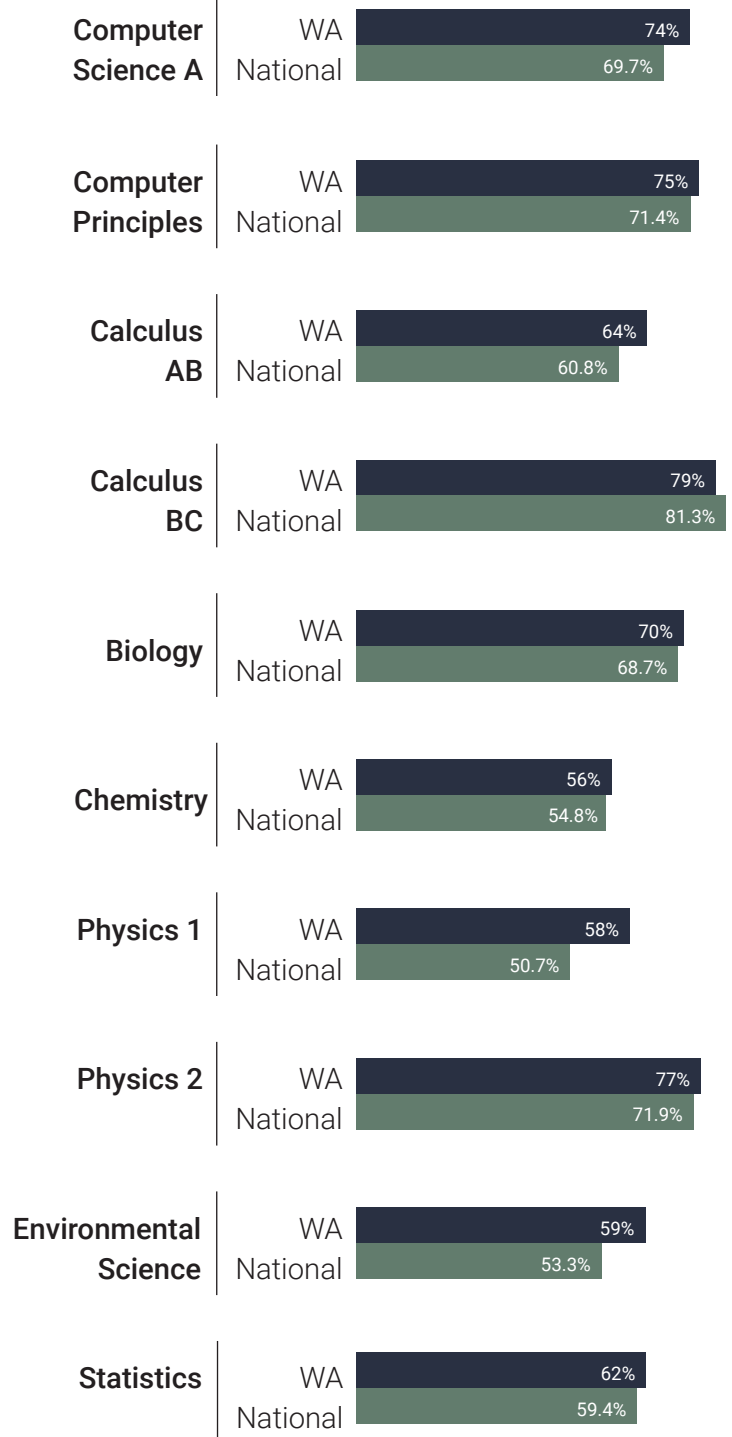
### 8th-GRADE SCIENCE

Percent meeting math standard



## College Readiness

In 2020, Washington students consistently outperformed national averages for AP exam pass rates\* in nine out of ten STEM subjects.<sup>5</sup> Scores on these tests are a good measure of college readiness. Research shows that students who score a 3 or higher on AP exams typically experience greater academic success in college and are more likely to earn a degree on time than non-AP students.



\* A passing grade is defined as a score of 3 or higher

However, there is wide disparity in AP exam performance and participation across various demographic groups. American Indian, African American, and Hispanic/Latinx students, who have been historically underrepresented in STEM, are much less likely to take AP exams in STEM. They also tend to have lower pass rates. Expanded efforts are needed to support more students from these groups to engage in STEM, enroll in AP and other dual credit courses, and prepare to succeed in postsecondary studies.

## AP Exams, 2020

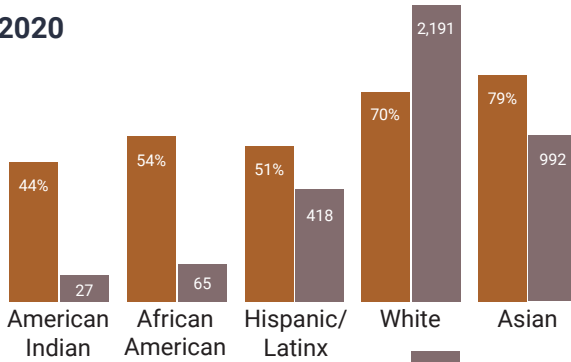
### Biology

**% Passing**

AP Exams

**# Taking**

AP Exams



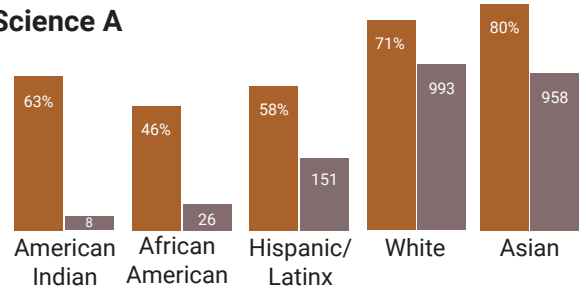
### Computer Science A

**% Passing**

AP Exams

**# Taking**

AP Exams



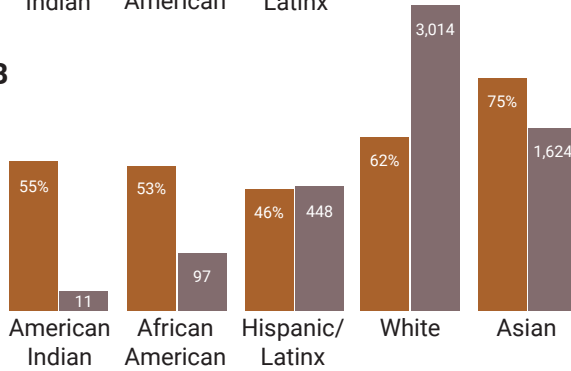
### Calculus AB

**% Passing**

AP Exams

**# Taking**

AP Exams



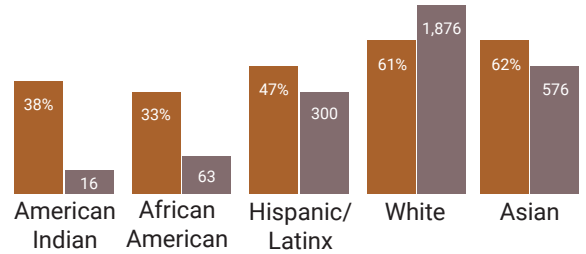
### Environmental Science

**% Passing**

AP Exams

**# Taking**

AP Exams



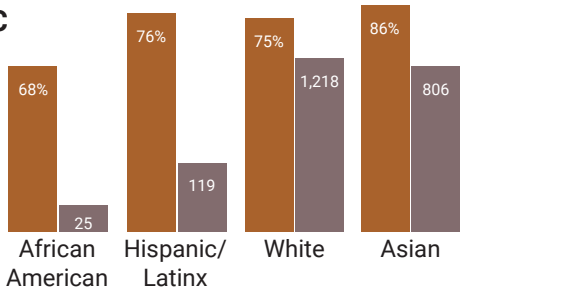
### Calculus BC

**% Passing**

AP Exams

**# Taking**

AP Exams



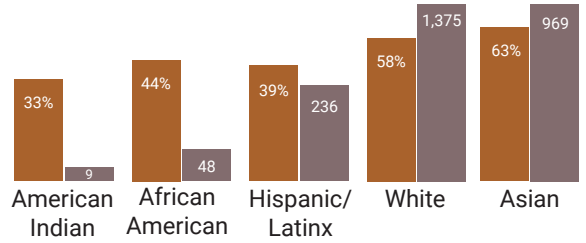
### Physics 1

**% Passing**

AP Exams

**# Taking**

AP Exams



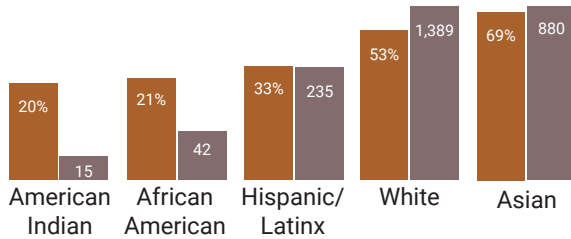
### Chemistry

**% Passing**

AP Exams

**# Taking**

AP Exams



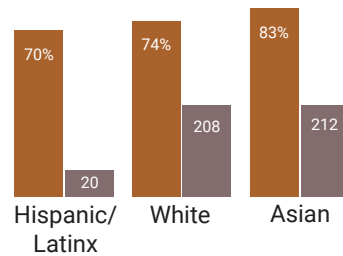
### Physics 2

**% Passing**

AP Exams

**# Taking**

AP Exams



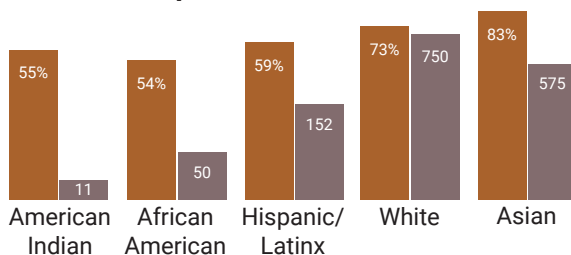
### Computer Science Principles

**% Passing**

AP Exams

**# Taking**

AP Exams



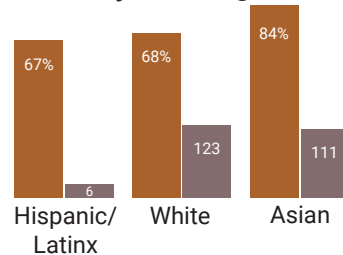
### Physics C: Electricity and Magnetism

**% Passing**

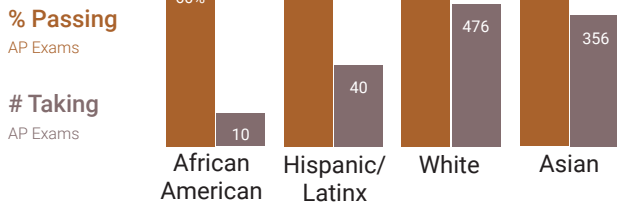
AP Exams

**# Taking**

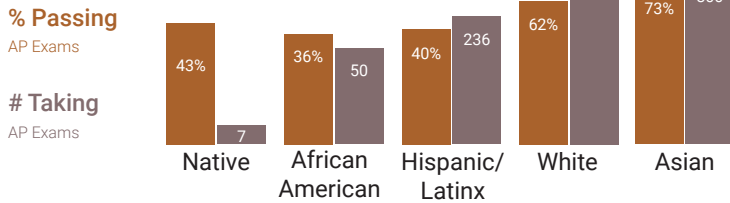
AP Exams



## Physics C: Mechanics



## Statistics



## Student Interest in STEM

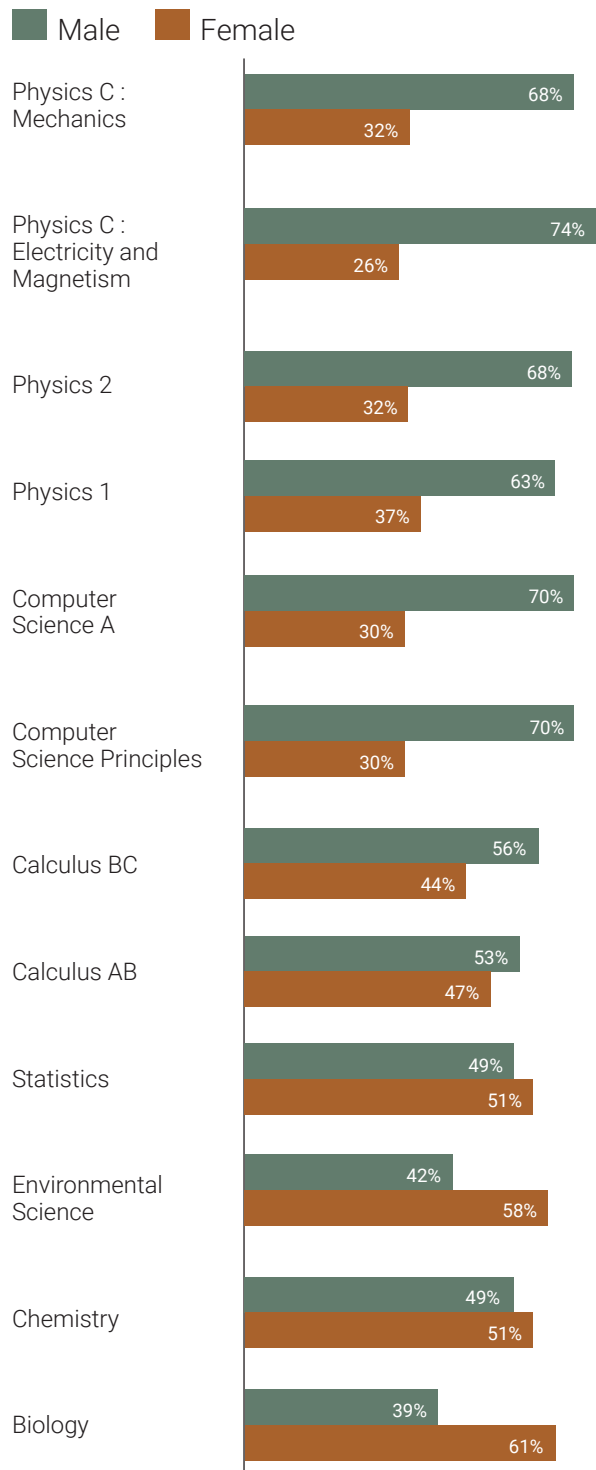
Over the past decade, the percentage of students taking SAT tests who indicated they intend to major in a STEM subject in college has shown a moderate but consistent increase each year. The percentage interested in a STEM major rose from 25 percent in 2010–11 to 35 percent in 2020–21.<sup>6</sup>

## The STEM Gender Gap

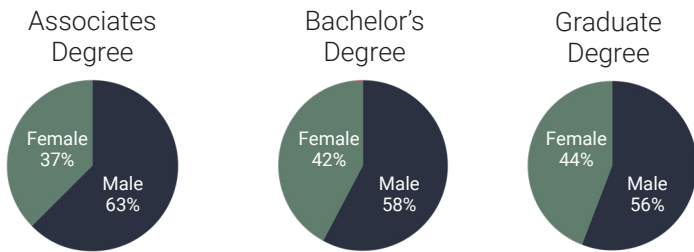
Girls and boys tend to begin school with comparable math and cognitive skills, and girls tend to score as well or higher than boys on K-12 assessments in math and science. STEM achievement among female students tends to recede as they move through their education. New innovative strategies may be needed to close this STEM gender gap.

- Among pre-K students, girls tend to do as well as boys in math, with about 68% demonstrating “kindergarten readiness” in the 2019-20 WaKIDS assessment.<sup>7</sup>
- However, as they advance in their education female students tend to be less likely to participate in certain AP STEM courses and less likely to complete STEM degrees.
- Male and female students have comparable pass rates for AP exams but (as shown in the following chart) a significantly lower percentage of women take the exams.

## Percent Taking STEM AP Tests in 2020 by Gender



Female college students also complete STEM degrees in fewer numbers than male students. In 2020, the percentage of female students who completed STEM degrees were:<sup>8</sup>



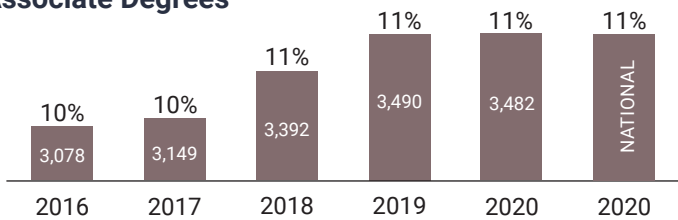
## Postsecondary Education and Workforce Alignment

STEM Degree Completions are Increasing overall, and as a percentage of all degrees at the associate, bachelor's, and graduate levels. But keeping pace with rising employer demand for skilled, STEM-educated workers remains a challenge.

STEM degree and long-term certificate completions have shown steady increases from 2016 to 2020.<sup>9</sup>

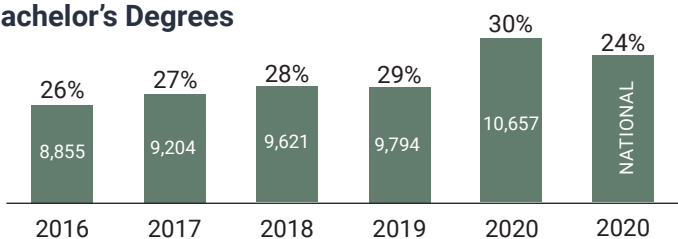
**Associate Degree** completions in STEM fields increased by more than 13%. In 2020, STEM associate degree completions represented 11 percent of all associate degrees, a modest 1 percent increase from 5 years ago.

### STEM Associate Degrees Percent of All Associate Degrees



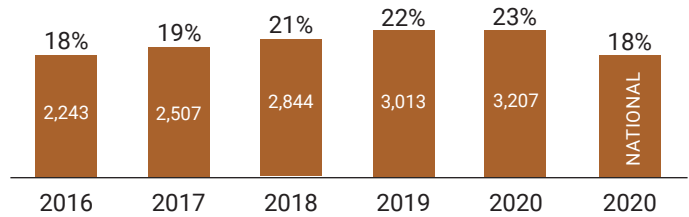
**Bachelor's Degree** completions in STEM fields increased by more than 20 percent. In 2020, STEM bachelor's degree completions represented 30 percent of all bachelor's degrees, a 4 percent increase from 5 years ago.

### STEM Bachelor's Degrees Percent of All Bachelor's Degrees



**Graduate Degree** completions in STEM fields increased by more than 40 percent. In 2020, STEM graduate degree completions represented 23 percent of all bachelor's degrees, a 5 percent increase from 5 years ago.

### STEM Graduate Degrees Percent of All Graduate Degrees



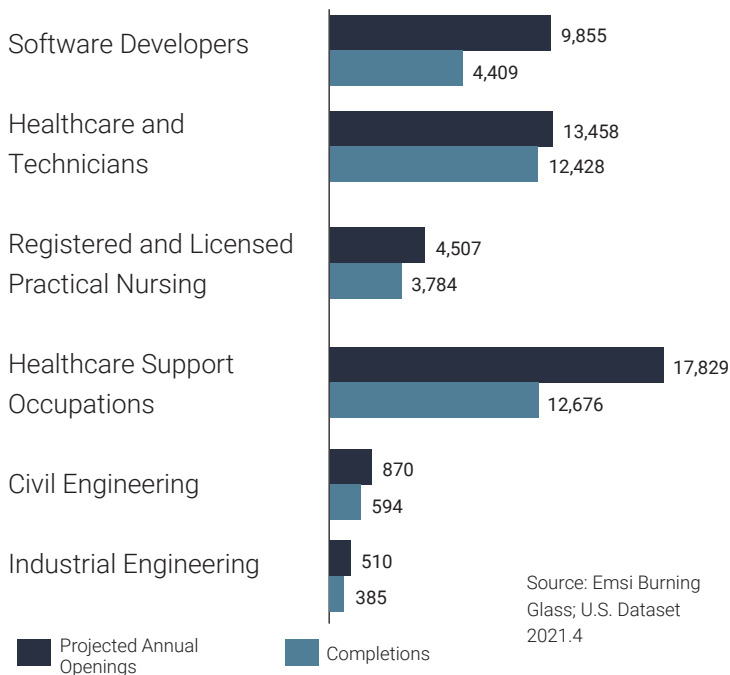
But even with these increases, rapidly growing workforce demand is still outpacing STEM degree production in many occupational fields. Over the course of the next ten years, from 2021–2031, jobs in:<sup>10</sup>

- **Computer and mathematical occupations** are projected to grow by 10 percent, with over 18,500 average annual openings.
- **Software Development** are projected to grow by 15 percent, with over 9,850 average annual openings.
- **Healthcare support occupations** are projected to grow by 19 percent, with over 27,000 average annual openings.
- **Healthcare practitioners and technical occupations** are projected to grow by 7 percent, with over 12,400 average annual openings.
- **Life, physical, and social science occupations** are projected to grow by 10%, with over 4,400 average annual openings.



Workforce supply and demand gaps are seen in a number of STEM occupational clusters, where degree completions in relevant educational programs are not keeping pace with employer demand for workers with STEM skills. The following chart shows a range of occupations where gaps are evident. Projected annual openings exceed annual degree completions for healthcare practitioners and technicians (8 percent), registered and licensed practical nurses (19 percent), civil and industrial engineering (41 percent), healthcare support occupations (120 percent), and software developers (124 percent).

### STEM Workforce Supply and Demand Gaps



## 2021 Legislative Session Highlights – Key Impacts on STEM Education

- **SHB 1425** - Washington State Opportunity Scholarship expanded for community and technical college students to include programs leading to industry-recognized credentials.
- **E2SSB 5237** - Expansion of eligibility and access to the Early Childhood Education and Assistance Program.
- **SB 5299** - Computer science credits approved to meet high school mathematics or science graduation requirements
- **SSB 5401** - Community and technical colleges authorized to offer bachelor’s degrees in computer science.
- **SHB 1302** - Eligibility for participation in College in the High School programs expanded to ninth grade students and caps set on maximum fees per college credit.
- **E2SHB 1365** - Expansion of access to computers and other internet-accessible learning devices for high school students
- STEM-related budget provisos Increased funding for:
  - University of Washington Medical Center/ Harborview Support
  - UW- WWAMI Regional Medical Education Program/UW School of Medicine-Spokane
  - UW School of Dentistry
  - Washington State University Elson S. Floyd College of Medicine
  - Bachelor’s Degree Program in Computer Science at CWU – Des Moines center
  - University of Washington Computer Science program



# 2022 STEM Alliance Policy Recommendations

For the 2022 legislative session, the STEM Alliance offers policy recommendations in three key areas:

## 1. Expand STEM Educator Pathways

- Increase funding for three Professional Educator Standards Board (PESB) programs to improve the STEM teacher pipeline: Teacher Academy, Recruiting Washington Teachers, and the Bilingual Educator initiative.
- Increase funding for the Washington Student Achievement Council's (WSAC) Educator Conditional Scholarship program, to help current teachers re-tool and add STEM endorsements, assist paraeducators in earning teaching credentials, and allow soon-to-be teachers to earn money for school in exchange for service in Washington classrooms.

## 2. System Improvements for Early STEM Learning

- Support the ongoing creation and usage of State of the Children reports.
- Increase alignment and improve use of Washington Kindergarten Inventory of Developing Skills (WaKIDS) assessment.
- Expand OSPI's "Pathways" series to articulate the developmental progression of skill development for STEM.
- Support access to outdoor learning in preschool and early grades, to promote curricula rooted in STEM concepts and pedagogy.

## 3. Expand STEM Career Readiness

- Increase Computer Science access by supporting regional implementation, community partnerships and planning.
- Create a grant program to fund regional coordinators (Career Connected Learning Rural Navigators) who will help direct community based outreach, develop business & education partnerships, and expand engagement in career connected STEM programs.

## Concluding Remarks

STEM education is vital to Washington's innovative technology sector and aligning the state's STEM education system with workforce demand is imperative. It is crucial to expanding good career opportunities for Washington residents and to maintaining a healthy, dynamic economy. Expanding institutional enrollment capacity in key fields may remove barriers that are driving some of the supply and demand gaps, particularly in fields such as computer science. Another key to advancing alignment will require addressing equity issues, to make sure that groups that have been historically underrepresented in STEM are given the resources they need to succeed in their degree and career goals.

## ENDNOTES

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<sup>1</sup> Washington State Office of Superintendent of Public Instruction, Report Card. Washington Kindergarten Inventory of Developing Skills (WaKIDS).

<sup>2</sup> Washington State Office of Superintendent of Public Instruction, Report Card. Washington Kindergarten Inventory of Developing Skills (WaKIDS).

<sup>3</sup> 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-States-Early-Childhood-Education-and-Assistance-Program\\_Report.pdf](https://www.wsipp.wa.gov/ReportFile/1576/Wsipp_Outcome-Evaluation-of-Washington-States-Early-Childhood-Education-and-Assistance-Program_Report.pdf).

<sup>4</sup> Washington State Office of Superintendent of Public Instruction, Report Card. Smarter Balanced Assessments. 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.

<sup>5</sup> College Board. AP Program Participation and Performance Data 2020.

<sup>6</sup> Education Research and Data Center (ERDC) staff analysis of College Board SAT Suite of Assessments Annual Reports (November 2020).

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

<sup>8</sup> Integrated Postsecondary Education Data System (IPEDS), National Center for Education Statistics.

<sup>9</sup> Integrated Postsecondary Education Data System (IPEDS), National Center for Education Statistics.

<sup>10</sup> Emsi Burning Glass; U.S. Dataset 2021.4.



# 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.

## STEM Alliance Membership

### **2022 Washington State Teacher of the Year**

**Jerad Koepp**

*Native Student Program Specialist,  
North Thurston School District*

### **Amazon**

**Lindsay Hopkins**

*Program Manager, AWS Educate  
Cloud Degree*

### **Association of Washington School Principals**

**Scott Friedman**

*Associate Director*

### **Ballmer Group**

**Andi Smith**

*Executive Director, Washington*

### **Bill & Melinda Gates Foundation**

**Lindsay Lovlien**

*Senior Program Officer*

### **Career Connect Washington**

**Maud Daudon**

*Executive Leader*

### **Citizen Member**

**Jeff Estes**

### **Code.org**

**Hadi Partovi**

*Founder*

### **College Success Foundation**

**James Dorsey**

*President & CEO*

### **Community Colleges of Spokane**

**Christine Johnson**

*Chancellor*

### **Council of Presidents**

**Paul Francis**

*Executive Director*

### **FIRST (For Inspiration and Recognition of Science and Technology) Washington**

**Erica Beckstrom**

*President*

### **Greater Spokane Inc.**

**Alisha Benson**

*CEO*

### **Independent Colleges of Washington**

**Terri Standish-Kuon**

*President & CEO*

### **Mentors in Tech**

**Kevin Wang**

*Founder*

### **Microsoft Philanthropies**

**Jane Broom Davidson**

*Senior Director*

### **Microsoft Philanthropies Technology Education and Literacy in Schools Program**

**Patrick O'Steen**

*West Region Lead*

### **North Central Educational Service District**

**Sue Kane**

*Director of STEM Initiatives and  
Strategic Partnerships*

### **Office of Superintendent of Public Instruction**

**Shandy Abrahamson**

*Career Connected Learning Tribal  
Engagement Specialist, Office of  
Native Education*

### **Office of Superintendent of Public Instruction**

**Chris Reykdal**

*Superintendent*

### **Pacific Education Institute**

**Kathryn Kurtz**

*Executive Director*

### **Pacific Northwest National Laboratory**

**Evangelina Galvan Shreeve**

*Director, Office of STEM Education*

### **Pacific Science Center**

**Will Daughtery**

*President and CEO*

### **Raikes Foundation**

**Dina Blum Burlingame**

*Program Officer, Education*

### **Starbucks Corporation**

**Evan Smith**

*Vice President, Technology Strategy  
and Business Transformation*

### **STEMCore Consultants**

**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**

**Gregory King**

*Executive Director*

### **Washington State Board for Community and Technical Colleges**

**Jan Yoshiwara**

*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**

**Lisa Brown**

*Director*

### **Washington State Department of Labor & Industries**

**Joel Sacks**

*Director*

### **Washington State Employment Security Department**

**Cami Feek**

*Commissioner, Executive Programs*

### **Washington State Labor Council, AFL-CIO**

**Larry Brown**

*President*

### **Washington State Office of the Governor**

**John Aultman**

*Executive Policy Advisor for  
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**

**Jenee Myers-Twitchell**

*Chief Impact Officer (interim member)*

### **Washington Student Achievement Council**

**Mike Meotti**

*Executive Director*

### **Wenatchee Valley College**

**Karina Vega-Villa**

*Mesa Program Director*