Vision 2021: Investing in a Future Ready Washington
Strategic Action Plan prepared by the Governor's STEM Education Innovation Alliance

Executive Summary

What skills will Washingtonians need to thrive in a vibrant Washington economy? Washington's communities are home to global STEM industry leaders and innovators. Washington-based companies in fields such as aerospace, clean energy, high-tech, health sciences, and advanced manufacturing are changing lives here at home and across the world. The state's ability to attract, develop, and retain STEM talent is vital for fostering opportunity for every Washingtonian and economic growth innovation and competitiveness. Washington state **ranks #1 nationally** in the concentration of STEM related jobs *(Source: Council of State Governments, 2015) yet* ***ra*****nks 47th in the nation** and last among high-tech-intensive states in the proportion of high school graduates who go directly to college (36.7%).

It is clear that many young Washingtonians are not on a path to participate in a Future Ready economy.

To achieve an innovative and dynamic workforce, and to address gaps between degree production and employer demand in key fields, the Governor's strategic plan supports leaders to advance a STEM education vision that is equitable, accessible, and supported over the next five years. The success of this plan will be a major contributor to achieving the state's 70% postsecondary attainment goal.

Rationale: Resources, activities, and policies—local, state, federal, and private—are not focused or aligned to address the state's STEM challenges. A strong and vibrant Washington state economy requires greater coordination, smarter investments, and measurable results.

The Governor's plan builds upon the 2015 STEM Framework For Action and Accountability by now releasing an aligned strategic plan to spur high priority actions and measure progress.

To **accelerate progress**, we are recommending **five actionable goals** for immediate attention:

1. Inspire youth through career connected and real-world STEM learning opportunities.
2. Provide every K-12 student access to computer science education.
3. Prepare Washington's future workforce by increasing attainment of technical credentials, 2 and 4-year degrees and contributing to Washington's 70% attainment goal.
4. Improve equity by implementing interventions to close educational opportunity gaps, providing world-class preparation and support for STEM teachers and improving workforce diversity.
5. Raise public awareness and support for STEM.

Table of Contents: To be inserted when document pages are final.

The STEM Imperative for Washington State

From Puget Sound to eastern Washington, our economy is rooted in innovation. We currently rank 2nd in the nation in concentration of STEM jobs, employing more than 9 percent of the state's total workforce in the STEM sector. Of Washington's top 25 occupations, 11 of our top available jobs this year are STEM-related and comprise more than half (approximately 28,000) of the nearly 48,000 open jobs across the state. With multiple pathways to these STEM jobs—postsecondary certification programs, two-year technical degrees and four-year university degrees—our young people can be poised to lead the way for the U.S. in fields as varied as clean energy, computer science, maritime engineering, horticulture, health care and medical research.

Reaching the state attainment goal of "at least 70% of adults ages 25-44 in Washington State will have a postsecondary credential" is contingent upon STEM success due to the anticipated increase degrees needed to fill STEM jobs. To meet Washington workforce needs, Future Ready Washington students must be prepared for STEM careers or equipped with STEM literacy if not choosing a STEM career.

This plan is meant to provide focused goals and a short list of actionable items. including public-private partnerships and multi-sector networks to spur greater alignment, coherence, and innovation.

Background on current efforts underway

The Governor's STEM Alliance, created by HB 1872, established a comprehensive initiative to increase learning opportunities and improve educational outcomes in science, technology, engineering, and mathematics through multiple strategies and statewide partnerships. The STEM Alliance is a key leadership group that advises Governor and adopted a STEM Framework for Action and Accountability to outline strategic objectives for the state.

Washington STEM, a non-profit dedicated to advancing excellence, equity, and innovation in STEM education in Washington state raises the profile and public demand for STEM through regional STEM networks, innovation, and policy partnerships. Washington STEM supports 10 community led regional STEM networks around the state which collectively reach 50% of the K-12 students in the state. Each regional STEM Network is comprised of local education, business and community groups that agree upon common goals and agree to align resources, activities and partnerships to accelerate progress for students. The time is right for coordinated public-private partnership approach.

In 2013, Governor Inslee signed House Bill 1472, opening the door for schools across the state to count advanced placement computer science as a math or science credit. The law's goal is to improve and expand access to computer science education, a high demand skill in Washington's technology-fueled economy. Substitute House Bill 1813 (2015) established K-12 education standards for computer science, created a K-12 computer science teaching endorsement, and enabled teachers to access state scholarships when pursuing computer science professional development.

The commitment to computer science continued in 2016 with the Governor's Computer Science for All initiative and partnership to promote K12 computer science education policy goals for states.

Call to Action

Mission

All stakeholders will work in collaboration committed to ensuring that Washington has a world class STEM education system that improves career and college readiness, improves affordability and access to post-secondary STEM degrees, increases college completion, and meets workforce demands.

Vision

- All Washingtonians have the STEM skills necessary to live a life of opportunity and success in the state's thriving innovation economy and democratic society by leading the nation in:

    ✓STEM literacy for all

    ✓A diverse, world-class workforce

Goals

1. Inspire youth through c**areer connected and real-world STEM** learning opportunities.
2. Provide every K-12 student **access to computer science** education.
3. Prepare Washington's future workforce by increasing attainment of technical credentials, 2 and 4-year degrees and contributing to **Washington's 70% attainment goal.**
4. Improve equity by implementing interventions to **close educational opportunity gaps,** providing world-class preparation and support for STEM teachers and improving workforce diversity.
5. Raise public awareness and **support for STEM**.

1. Inspire youth through c**areer connected and real-world STEM** learning opportunities.

Current Status	Actions Needed *Actions will be measured and tracked on an annual basis
Students, especially those of color, girls, and low income, often do not receive knowledge about these career pathways during their K-12 experience, nor do they engage in attendant activities such as career networking events, internships, and job shadowing.	Forge public-private partnership with Washington STEM to provide career connected learning experiences K-12 through multi-sector regional collaborations designed to increase apprenticeships, internships and other experiences that help prepare students for high-demand family wage careers.
NGSS adopted, including engineering practices. Teachers lack high quality professional development and resources. Quality STEM professional development and access to industry partnerships are not equitably available across Washington.	Upgrade science instructional materials and "kits" to align with NGSS, embedding engineering through industry- and place-based design challenges and provide aligned PD. Establish a long-term, steady, reliable, consistent funding to support the full continuum of STEM education, from early learning through post-secondary and workforce training, to ensure that students are prepared to pursue their goals and keep Washington's world-class economy strong.
STEM guided pathways are not coherent and aligned between secondary and post secondary settings. Accordingly, students do not have access for relevant career pathway information at the times that they need to make critical decisions.	Foster STEM guided pathways and associated course development; ensure coordinated and seamless planning across the K12, community college system, higher education institutions and workforce development.

Current Status	Actions Needed *Actions will be measured and tracked on an annual basis
Career and Technical Education offerings are not fully aligned with the state's high-demand, family wage employment projections and are not consistently available from district to district.	Fully fund CTE and optimize CTE programs to prepare students in high-demand family wage jobs leading to careers; place emphasis on CTE as a viable and equal option to traditional pathways.
Access to career pathways in high skill, high-demand sectors are defined as students in grades 7-12 enrolled in school districts that offer at least one course in high-demand career pathway, either at a school in their home district or a Skills Center affiliated with the school district. Career pathways in high-skill, high demand sectors include those occupations where demand exceeds supply, based on the Occupational Employment Survey conducted by the Employment Security Department and Bureau of Labor Statistics.	By the 2018-19 school year, OSPI should develop and implement a process for scaling or phasing out pathways that don't lead to credentials in high-skill, high demand programs. State and local employer needs should drive CTE course approvals and district offerings.

2. Provide every K-12 student **access to computer science** education.

Current Status	Actions Needed
State had $4M public-private CS grant fund which impacted 11% of K-12 schools.	Accelerate state and private investment in CS so that we reach at least 50% of Washington students in the next three years; Embed CS in basic education, integrating it into core subjects.
Grant funding exists for district technology; and has increased computer science professional learning and resources for educators.	All high schools offer an introductory computer science course; a steady increase in the number of grade levels offering computer science; and computer science is offered at every level K- 12.
At the elementary level, computer science access is limited.	Streamline process for high school teacher computer science endorsement including competency-based options; institute computer science "micro-credential" for elementary and middle school teachers; expand pre-kindergarten through 5th grade student opportunities to develop computational thinking skills by creating incentives; embed computer science training in teacher preparation programs.
HB 1813 mandates the Superintendent of Public Instruction to adopt nationally recognized computer science learning standards in K12.	Create a Computer Science vision and implementation plan that includes PreK-5 student opportunities to develop computational thinking by creating incentives.
Governor's Computer Science For All initiative	Train and deploy CS educator fellows; create models and tools to enable scale-up of best practices. Amend state policy to ensure ample supply of CS teachers.

3. Prepare Washington's future workforce by increasing attainment of technical credentials, 2 and 4-year degrees and contributing to **Washington's 70% attainment goal.**

Current Status	Actions Needed
Students enrolled in dual-credit programs are more likely to complete high school and continue on to postsecondary education. However, differences in participation and completion by race, ethnicity, and income continue to persist. For example, Hispanic students make up 19% of the total population, yet are represented at rates of 12% in Advanced Placement and Running Start programs, and13 percent in College in the High School Programs. (Dual Credit Report, WSAC, October, 2016).	Develop alternative course equivalencies; increase dual credit programs, expand funding for College in the High School to serve all qualified students and provide greater access to the advanced coursework necessary for success in STEM majors; improve communication about dual-credit opportunities.
There are bottlenecks in high-demand and priority workforce courses and barriers to appropriate student time to degree. Often, students have not taken the appropriate coursework, especially in math, to support appropriate time to degree. In addition, federal funds for fee waivers for AP exams may no longer be available as a result of ESSA and restructuring of federal grants. (Dual Credit Report, WASC, October, 2016)	Ensure appropriate support and enhance time to degree; foster private-public partnerships that support effective pathways; ensure support for AP and dual credit programs.
Affordability can be a barrier to access and attainment of high demand STEM credentials and degrees. In particular, constant uncertainty about the cost of college undermines the ability of families to plan for and support students as they pursue college degrees. Low-income and first generation families are especially sensitive to these threats and are more likely to limit college enrollment based on perceptions about cost. (Source: 2013 Diversity Report, WSAC)	Support students with stipends and/or student aid in pre-apprenticeship programs as they prepare to enter programs such as the Registered Tech Apprenticeship program developed by Washington Technology Industry Association (STEM Education Innovation Alliance Recommendations to the Governor, September 27, 2016); continue funding for WSOS; support Guided Pathways.

Current Status	Actions Needed
Postsecondary pathways for historically underserved populations, transfer students, veterans, and adult learners lack support. MESA has been successfully piloted at 6 of 34 community colleges.	Strengthen pathways for historically underserved populations, transfer students, veterans, and adult learners; expand the MESA program to make it available at every community college in Washington; Increase funding for State Work Study and allow colleges to create new mentor partnerships with K-12 schools by allowing 100% match rates for programs that enable college students to help at-risk secondary school students. Foster public-private partnerships that support effective pathways.
Washington State is developing a state plan to implement the Federal Every Student Succeeds Act. The Act explicitly names STEM and Computer Science as priority and allowable uses of federal funds.	Prioritize STEM and computer science within the state's Every Student Succeeds Act (ESSA) implementation plan. This action will incentivize local school districts to use federal funds to expand STEM and CS offerings and align OSPI supports.

4. Improve equity by implementing interventions to **close educational opportunity gaps**, providing world-class preparation and support for STEM teachers and improving workforce diversity.

Current Status	Actions Needed
Wide variation exists across Washington's teacher preparation programs with a wide variance in STEM specific preparation.	Ensure mathematics teachers in the early grades have deep content knowledge; Increase STEM mastery of elementary school teachers.
Exposure to science education varies widely across elementary schools with an average of 2.3 hours per week spent on science instruction; In 2015, only 32 percent of incoming kindergarten students demonstrated the math skills expected of five-year olds.	Develop instructional materials that build on the strength of the current K-5 "kit" system, supplement those materials to support engineering practices through design challenges and feature the work of local industry across the state; Develop and offer mathematics specialization for teachers in grades K-3 along with incentives to attract teachers into this specialization.
For many students of color, for special education students, for English language learners, and for students who are low income, homeless, or in foster care, graduation rates are low when compared to the rate for all students.	Continue to support the Educational Opportunity Gap Oversight and Accountability Committee (EOGOAC) addresses the opportunity gap in Washington and makes recommendations to expand pathways and strategies to prepare and recruit diverse teachers and administrators.
There are limited role models for many students of color and females due to a lack of diversity in the workforce; women leave tech companies at a higher rate than men and fewer blacks and Latinos with degrees in tech-related subjects get hired.	Support career-connected learning, especially in fields with underrepresented populations; implement and support K12, secondary and innovative workforce development opportunities and workforce diversity retention programs such as free or reduced cost apprenticeships, MESA, ADA Developers Academy, and the Washington Technology Industry Association's apprenticeship program.
Retention of high-quality STEM teachers is challenging and many vacate the education industry during the first five years.	Increase the professional status of STEM teachers and support incentivized compensation; Launch team of STEM "Master Teacher Corp" or STEM Ambassadors.

5. Raise public awareness and support for STEM.

Current Status	Actions Needed
Public demand for STEM is high: Ninety-four percent of Washington voters believe every child should have access to a high quality science, technology, engineering, and math (STEM) education in the state's K-12 public schools, but just 45 percent believe that is happening today. Source: 2015 WA STEM Poll.	Increase funding and support of a statewide network and regional networks. through a public-private partnership; Successful models of education-private enterprise partnerships are highlighted, brought to scale, and used as models for replication.
Washington STEM supports ten regional networks to support the STEM pipeline in their local context through K12 professional learning, business and higher education partnerships, and communications and advocacy.	Support regional STEM networks and partners to inspire students and help students and families explore careers through innovative marketing campaigns, community based STEMfests and technology based apps and tools.
Communities, families, and students have inequitable access to STEM opportunities, access, and information. The uneven distribution of STEM education assets usually concentrates in the state's population centers, disadvantaging rural students, learners in low socioeconomic regions and under-represented minorities, resulting in a condition of haves and havenots.	Equip parents and teachers with STEM- related Washington-specific career information for creating awareness and interest among children and students; Enable Washington STEM to develop 10 industry-based challenges that engage teams comprised of regional STEM education leaders, engineering industry professions, higher education partners and teachers to identify regionally-relevant engineering design challenges.

Where are we today?

- A recent report by Boston Consulting Group estimates that only 9 out of 100 children born in Washington will ultimately end up as employees in a STEM-related field in the state.

- Washington employers are anticipating 740,000 job openings in the next five years; many require STEM and a postsecondary certificate or degree. Of the 150,000 entry-level jobs that will be available, nearly half will be filled by workers with a postsecondary credential (20 percent) or some college (24 percent). (Boston Consulting Group report, October, 2016)

- Only 31 percent of Washington high school students go on to attain a postsecondary credential by the age of 26.

- In 2015, only 32 percent of incoming kindergarten students demonstrated the math skills expected of five-year olds.

- Fifty-three percent of the state's fourth graders are just at or below basic on NAEP proficiency.

- 73% of all job growth in STEM between 2014 and 2024 will be in computer occupations.

- Only 3 percent of Washington's fourth grade teachers have an undergraduate major in mathematics in 2015.

- Washington elementary schools spend an average of 2.3 hours per week on science instruction. Only four other states reported less science instruction than Washington.

- Many young people in Washington, especially youth of color and from low income or rural communities, do not have access to experiences such as internships, job shadows and technical training programs that will give them the opportunity to decide what kinds of careers to pursue.

- In 2015, only 1,770 high school students in Washington took the AP Computer Science exam and only 95 high schools (of 439 high schools) in the state offered the AP Computer Science course in 2014-15.

- In 2012 Washington ranked 47th in the nation for participation in college by age 19 (36.7%). National average is 46.8%

- In 2013-2014 about 18 percent of graduates from postsecondary institutions graduated in a STEM field. Among those graduating in a STEM field, most are male (61 percent) and not low-income (83 percent).

- Women leave tech companies at a higher rate than men. Fewer blacks and Latinos with degrees in tech-related subjects get hired, and those who stay too often feel isolated.

- Today, only one in four STEM employees is female and only one in five is black or Hispanic. Efforts to target female, black, and Hispanic Making structural changes potentially increase their presence in the workforce by about 30 percent. (STEM Benchmark Report Card – First Annual Report January 10, 2015)

Appendix III: Basic Definitions of Science, Technology, Engineering, and Math (STEM)

STEM Literacy: Per RCW 28a.188.010, STEM Literacy:

"STEM" means science, technology, engineering, and mathematics.

To provide focus and clarity to efforts to increase learning opportunities and improve educational outcomes in STEM, the following definition of STEM literacy is adopted:

The component parts of STEM literacy are:

Scientific literacy, technological literacy, engineering literacy, and mathematical literacy.

Scientific literacy: the ability to use scientific knowledge and processes in physics, chemistry, biology, and earth and space science to understand the natural world and to participate in decisions that affect it.

Technological literacy:Technological literacy, which is the ability to use new technologies, understand how technologies are developed, and have skills to analyze how new technologies affect individuals, the nation, and the world. Technology is the innovation, change, or modification of the natural environment to satisfy perceived human needs and wants.

Engineering literacy:Engineering literacy, which is the understanding of how technologies are developed through the engineering design process. Engineering design is the systematic and creative application of scientific and mathematical principles to practical ends, such as the design, manufacture, and operation of efficient and economic structures, machines, processes, and systems.

Mathematical literacy:the ability to analyze, reason, and communicate ideas effectively through posing, formulating, solving, and interpreting solutions to mathematical problems in a variety of situations