Building Partnerships to Get Results Workgroup Overview

Functional partnerships between education, workforce, economic development and industry are instrumental to efforts to align the education and training pipeline with the needs of the economy. Based on the analysis of national resources and leading state practice, the workgroup drafted baseline criteria for high-quality talent pipeline partnerships useful for identifying, seeding, and supporting productive partnerships for talent development.

What are High-Quality Talent Pipeline Partnerships?

The workgroup recognizes there is a need for functional partnerships at multiple levels – all which add value - but the workgroup is focused specifically on partnerships that enable strategic communication between education, workforce and industry about talent pipeline issues facing a region and/or sector:

Strategic State Level Partnerships	System Specific Partnerships	**Talent Pipeline Partnerships**	Program Specific Partnerships
For example: ▪ P-20 Councils ▪ State Workforce Investment Boards	*For example:* ▪ Local Workforce Investment Boards ▪ Chambers of Commerce	▪ Enable strategic communication between industry, education and workforce about the talent issues facing a region and/or sector. ▪ Focused on systems alignment and are beyond the scope of a single policy area of program. ▪ Examples of well-established approaches: ○ Sector partnerships ○ Career pathways partnerships	*For example:* ▪ Community College Advisory Boards ▪ Career and Technical Education Advisory Committees

Developing the Baseline Criteria: The Partnerships Workgroup's Approach

To develop the baseline criteria, the workgroup assessed leading state practice surfaced from discussions and reviewed existing national resources:

NGA Sector Strategies Evaluation Framework	National Fund for Workforce Solutions: Characteristics of High Performing Partnerships	USDOL, HHS, Department of Education: Career Pathway Toolkit
CLASP Career Pathway Framework, Criteria and Metrics	US Chamber of Commerce Foundation: Managing the Talent Pipeline	American Association of Community Colleges: Sustaining Partnerships for Growth

Evolving From Criteria to Metrics

Workgroup members recognized the multiple and evolving roles that criteria can play in a state's overall alignment strategy:

Stage One – Defining High Quality Partnerships: Criteria can be useful for initiating the culture change that allows for more strategic communication between education, training and industry. For example, criteria can be dropped into a state RFP to seed and support new partnerships, or to identify – and benchmark – existing high quality partnerships across a state.

Stage Two – Assessing the Value of High Quality Partnerships: For states with more mature partnership initiatives and networks, criteria can serve as the basis for developing metrics to assess and communicate value to a range of stakeholders – from industry to the Governor. Criteria can also help identify areas where states can provide technical support to strengthen partnerships.

Next Steps for the Partnerships Workgroup

The criteria presented in this document represents "Version 1.0" and the workgroup is seeking feedback from peers on how to improve and/or build upon these criteria. Further, the workgroup is looking to identify and document state experience using criteria to advance their talent pipeline strategies. It is the goal of the group to expand upon the criteria and present a toolkit for states on high quality partnerships. If you have feedback or interest in joining the workgroup, contact Brent Parton (bparton@nga.org).

This Version 1.0 document was developed by B. Parton and G. Groves (2015) as a product of the *Building Partnerships to Get Results Workgroup* within the National Governors Association Center for Best Practices Talent Pipeline Policy Academy. Workgroup members include: W. Hagy (IL), C. Herzog (NJ), C. King (WA), B. Kuhn (KY), E. Lesh (CO), D. Monear (WA), and M. Rothchild (MN).

Baseline Criteria for High Quality Talent Pipeline Partnerships

Stage One – Defining High Quality Partnerships → **Stage Two – Assessing the Value of High Quality Partnerships**

Baseline High Quality Criteria – *For defining and identifying high quality talent pipeline partnerships*	**Criteria Indicators** – *For recognizing the high-quality criteria within partnerships*	**Examples of Partnership Metrics** - *For measuring and communicating the value of high quality partnerships (both process and outcomes)*
Employers Lead the Partnership	• Employers play leadership roles • Consistent and regular participation of employers in partnerships activities	*Process: (i.e. number of employer partners, regular attendance, holding leadership positons)* *Outcomes*: *(i.e. employer investment in partnership)*
A Shared Vision and Clear Roles and Responsibilities Guide Partnership Activities	• A clear strategy and action plan • Delineated roles and responsibilities for all partners • A coordinator, convener, or backbone organization	*Process: (i.e. creation of an strategy and action plan, designation of partnership support team)* *Outcomes*: *(i.e. resources to support backbone capacity)*
Data Drives the Scope and Operation of the Partnership	• Scope of partnership shaped by industry and labor realities • Uses quantitative and qualitative data to identify industry sector demand and relevant credentials	*Process: (i.e. engagement of state data to identify regional/sector skills gaps, industry concentrations)* *Outcomes*: *(i.e., quantifiable and partnership specific credential attainment/employment goals)*
The Partnership Impacts Education and Training Decision-making	• Includes all critical partners across education and training pipeline • Shapes the development of career pathways and programs (i.e. career readiness, apprenticeships)	*Process: (i.e. number of education and training partners, establishment of new career pathways* Outcomes: *(i.e articulation agreement time savings, investment in work-based learning programs)*
The Partnership Demonstrates Tangible Results and Shared Value	• Capacity to demonstrate outcomes for pathway participants, the relevant sector and/or region • Attention to continuous improvement and sharing best practices	*Process: (i.e., data systems alignment, balanced scorecard for partnership)* *Outcomes*: (*i.e. attainment, employment, employer satisfaction, employee retention, reduced time to hire*)
There is a Strategy and Plan to Sustain Partnership Activities	• Leverages diverse, braided funding resources • A plan for securing sustained funding as appropriate	*Process: (i.e. development of sustainability plan)* *Outcomes: (i.e amount of resources secured to support implementation of time-fixed strategic plan)*

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The Governor's STEM Education Innovation Alliance

Annual Benchmark STEM Report
DRAFT - November 11, 2016

For Review by the Washington Alliance

The Governor's STEM Education Innovation Alliance Members (2015)

John Aultman	Executive Director STEM, Legislation & Partnerships, Everett School District – Curriculum, Assessment & Special Programs
Brian Bonlender	Director, Washington State Department of Commerce
Violet "Vi" Boyer	President and CEO, Independent Colleges of Washington
Marty Brown	Executive Director, State Board for Community and Technical Colleges
Jeff Charbonneau	2013 National Teacher of the Year, Zillah High School and Educational Service District 105
Maud Daudon	Director & CEO, Seattle Metropolitan Chamber of Commerce
Susan Enfield	Superintendent, Highline School District
Jeff Estes	Director, Office of STEM Education, Pacific Northwest National Laboratory
Paul Francis	Executive Director, Council of Presidents
Christine Johnson	Chancellor, Community Colleges of Spokane
Scott Keeney	President & CEO, nLIGHT Corporation
Caroline King	Chief Policy Officer, Washington STEM
Ed Lazowska	Bill & Melinda Gates Chair, University of Washington Computer Science & Engineering
Glenn Malone	Executive Director, Puyallup School District – Assessment, Accountability & Student Success
Marcie Maxwell	Citizen Member
Gil Mendoza	Deputy Superintendent, Office of Superintendent of Public Instruction
Rai Nauman Mumtaz	Student Representative
Isabel Munoz-Colon	State Board of Education member, City of Seattle, Office for Education
Eleni Papadakis	Executive Director, Workforce Training and Education Coordinating Board
Dana Riley Black	Director, Institute for Systems Biology – Logan Center for Education
Gene Sharratt	Executive Director, Washington Student Achievement Council
Brad Smith	President, Microsoft Corporation
Stan Sorscher	Labor Representative, Society of Professional Engineering Employees in Aerospace
Brain Teppner	Principal, Newport Heights Elementary School, Bellevue School District
Nancy Truitt Pierce	Director, School Board, Monroe Public Schools
Margaret Tudor	Executive Director, Pacific Education Institute
Joyce Walters	CEO and Founder, Corporate Education Strategies
Yolanda Watson Spiva	President & CEO, College Success Foundation
Sam Whiting	President & CEO, Thrive Washington
Yale Wong	Chairman and Founder, General Biodiesel

ALTERNATES

Jane Broom Davidson	Community Affairs Director, Microsoft Corporation
Dan Grossman	Associate Professor, University of Washington Computer Science & Engineering

EXECUTIVE SUMMARY

Washington State's economy is booming, producing great jobs that offer competitive salaries in world-class technology, aerospace, clean-energy, and biomedical companies. But there is a critical shortage of workers needed to fill these jobs, and it is most acute in the state's most valuable jobs in science, technology, engineering, and math – collectively known as STEM.

In response to Washington's STEM challenge, Governor Inslee proposed the creation of the STEM Education Innovation Alliance. Formed in 2014, its members were to represent a broad range of business, labor, non-profit, and educational organizations, with the role of advising the Governor on strategic planning and the formation of effective partnerships in support of STEM initiatives in the state. In addition, the STEM Education Innovation Alliance is charged with submitting an annual STEM Benchmark Report Card to the Legislature each January in order to report on STEM economic and workforce trends, measure progress in improving STEM education in Washington, and communicate strategic priorities.

The following report serves as the Governor's STEM Education Innovation Alliance's second annual Benchmark Report Card to the Legislature to summarize the STEM Talent Supply and Demand Dashboard results and provide recommendations for improving STEM opportunities for all residents of our state.

STEM Talent Supply and Demand Dashboard Results:

- Raising awareness about STEM is key to STEM literacy and access to economic opportunities in our state; and, the good news is that knowledge of the term STEM has been growing in the last two years.
- Interest in STEM at early ages, an important key to increasing the number of students pursuing STEM-related fields, has increased slightly since 2010.
- Success in education, particularly in STEM subjects such as math, is affected by preparedness, especially in the early stages, but Washington has a ways to go to ensure that all students are meeting standards.
- Readiness for post-High School training and education is also key to meeting the demand for STEM-trained workers. In particular, readiness in the field of computer science is of critical importance to meeting future employer demands. Today, only about 27 districts in the state offer Advanced Placement (AP) computer science:
- Ensuring the supply of graduates from post-secondary institutions with degrees and credentials in STEM fields is critical to our state's future success. In our state, less than 20% of college graduates have a STEM degree.
- Aligning STEM education programs with workforce needs of key economic sectors is necessary for the growth of our economy. This includes ensuring that we have an adequate supply of STEM-trained workers in Washington to meet the demand of employers and understanding the potential gaps. Today, the answer is clear. There isn't enough supply of STEM workers to fill employer demand for these skills; and the gap is especially acute for employers seeking individuals with computer science degrees and skills.

Recommendations:

This report details several budget and policy recommendations that we urge you to act upon because we strongly believe that they are critical to our state's economic future and build upon current successful state-wide efforts. Important work underway we support include career and college readiness efforts such as: kindergarten readiness, Common Core State Standards, Next Generation Science Standards, Smarter Balanced assessments, dual credit/dual enrollment coursework, and computer science education programs. We believe that these reforms move our state towards rigorous expectations and opportunities for all our students. Our recommendations are as follows:

1. Fund College in the High School courses for more low income students in STEM-related courses.
2. Increase the funding and expand the MESA program from 6 Community Colleges to 12 Community and Technical Colleges this session, then to 34 CTC's in the following biennium.
3. Invest in educators' endorsements in computer science teaching by providing professional development opportunities so that they can nurture student interest in computational thinking in preparation for post-secondary programs and good jobs in this high demand field. Our specific recommendation is to consider accelerating the path to provide computer science opportunities for all students in Washington by investing more in the computer science endorsement scholarships for educators legislated last year. Our goal is for every student to experience computer science learning as a part of his/her education. As well, we recommend that EVERY classroom in the state participate in the Hour of Code this year during Computer Science Education week in December.
4. Endorse the Washington Student Achievement Council's (WSAC) request to sustain the Governor's STEM Alliance and the STEM Talent Supply and Demand Data Dashboard.

Unless much more is done to address the need for a STEM workforce, the skills gap will only increase in the years ahead. Many students will continue to leave Washington State to pursue higher education elsewhere, and employers will continue to seek out-of-state and international STEM talent to fill their workforce needs. Without improvement, leading companies may be driven to locate more and more jobs outside of the state. But, with focused effort, our state could be a national leader in STEM education. Washington should seize this opportunity to lead its residents into high-paying jobs and economic prosperity in the future. Action is needed now, and the recommendations set forth in this report are critical to making progress on STEM in our state.

INTRODUCTION

Washington State's economy is booming, producing great jobs that offer competitive salaries in world-class technology, aerospace, clean-energy, and biomedical companies. But there is a critical shortage of workers needed to fill these jobs, and it is most acute in the state's most valuable jobs in science, technology, engineering, and math – collectively known as STEM.

- A 2013 joint report by the Boston Consulting Group and the Washington Roundtable, calculated that, even after importing highly educated workers from out of state and abroad, Washington is missing out on an opportunity to fill as many as 25,000 high-skill jobs – a number that could double by 2017.
- Only 9 out of 100 children born in Washington will ultimately end up as employees in a STEM-related field in the state – far fewer than the number needed to fill Washington jobs requiring STEM-related skills. The situation is worse for low-income students, who are less academically prepared for the STEM workforce than their more affluent peers. Currently only 40 percent of high school students in Washington graduate with competency in STEM topics.[1]

STEM fields hold the jobs of tomorrow – and Washingtonians need to be ready to seize them.

In response to Washington's STEM challenge, Governor Inslee proposed the creation of the STEM Education Innovation Alliance, which was approved by the Washington State Legislature in 2013 in Engrossed Second Substitute House Bill 1872 (E2SHB 1872). Its members were to represent a broad range of business, labor, non-profit, and educational organizations, with the role of advising the Governor on strategic planning and the formation of effective partnerships in support of STEM education initiatives. In addition, the STEM Alliance is charged with submitting an annual STEM Benchmark Report Card to the Legislature each January in order to report on STEM economic and workforce trends, measure progress in improving STEM education in Washington, and communicate strategic priorities.

[1] Boston Consulting Group, Opportunity for All: Investing in Washington States' STEM Education Pipeline, 2014

The following report serves as the Governor's STEM Education Innovation Alliance's second annual Benchmark Report Card to the Legislature to provide recommendations for improving STEM opportunities for all residents of our state. This report is submitted by Matt Steuerwalt, Executive Director of Policy, Office of the Governor; and Gene Sharratt, Executive Director of the Washington Student Achievement Council on behalf of the Governor's STEM Education Innovation Alliance.

In addition to the preparation of this report, key accomplishments of the Governor's STEM Education Innovation Alliance to date are as follows:

- In March 2015, the Governor's STEM Education Innovation Alliance met with the Governor and formed a metrics sub-group committee to help in the development of state-wide STEM measures to track STEM progress in the state.
- In May and August 2015, the metrics sub-group committee met to discuss and operationalize the measures that are reported in this STEM Benchmark Report Card.
- In September of 2015, the development of an on-line STEM Talent Supply and Demand Dashboard for reporting progress on state-wide STEM measures began. Completion is expected in late December 2015.
- In November 2015, the Governor's STEM Education Innovation Alliance issued four priority policy recommendations to Governor Inslee. These are detailed in the recommendations section of this report.
- In December of 2015, an Education and Industry partnership sub-group committee will be formed to promote greater coordination of STEM activities.

Current funding to support the activities of the Governor's STEM Education Innovation Alliance is being provided by a National Governors Association (NGA) Center for Best Practices grant. This grant program supports states in planning and taking action to better align their education and training systems to meet the needs and employment opportunities in their states. Washington was one of eight states to earn a full award beginning in 2014. The two-year NGA-STEM grant provides $170,000 in funding and other resources to advance the Governor's STEM Education Innovation Alliance agenda. Funding has been supplemented by significant in-kind contributions from WSAC, ERDC, and Washington STEM.

BACKGROUND

Washington sits at the top of many state rankings in the areas of innovation-related human capital and research development.[2] Among a sample of states with significant technology sectors, Washington is the largest importer of technology degrees as a proportion of the population. The state has one of the highest proportions of STEM jobs in the nation, half of which are in computer science.[3] However, the state ranks low in the production of computer science and engineering degrees relative to job openings in those fields. And it ranks last among high-tech-intensive states in the proportion of high school graduates who go directly to college.

Washington currently cannot meet the demand for STEM talent with qualified local employees.[4] Nationally there are 2.5 times as many entry-level, STEM-related job postings as there are STEM graduates.[5] If the education "pipeline" supplying STEM workers is not fixed in Washington, the state will not be able to preserve and expand the number of jobs in this innovative sector. Already Washington employers rely heavily on talent from other states and nations to meet demand for this dynamic sector. Without progress in this area, STEM employers may begin to look to other parts of the country for more fertile ground on which to develop their companies.

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[2] STEM *State-Level Analysis,* Anthony P. Carnevale, Nicole Smith, and Michelle Melton, Georgetown University Center on Education and the workforce, October 2011, Https://cew.georgetown.edu/stem/states.

[3] *STEM Education in Washington: The Facts of the Matter*, Ed Lazowska, University of Washington, March 2013, http://lazowska.cs.washingto.edu/STEM/pdf.

[4] Washington Roundtable & The Boston Consulting Group. (2013). Great jobs within our reach: Solving the problem of Washington state's growing job skills gap. Retrieved from http://www.pacmtn.org/Impact/ reports/documents/BCGWRTGreatJobsWithinOurStateMarch2013.pdf. And, Washington Student Achievement Council, Washington State Board for Community and Technical Colleges, & Workforce Training and Education Coordinating Board (Forthcoming). A skilled and educated workforce. Olympia, WA: Washington Student Achievement Council.

[5] http://burning-glass.com/research/stem/

What is Holding Back Washington State? Beginning in the period before kindergarten and up to the time of obtaining full-time employment, many Washingtonians fall off the track for achieving some of the state's greatest economic opportunities. A Boston Consulting Group analysis shows that Washington loses 91 out of every 100 potential STEM employees in its workforce at some point "from cradle to career." Many of the students who are lost in the transition do so because of a lack of academic preparedness. Some of the key areas of concern identified in the Boston Consulting Group 2014 report are as follows:

- **Early Learning**: Nearly one-third of children are not ready for kindergarten (and even fewer are ready for math). They enter the K-12 education system at a disadvantage due to access to affordable high-quality preschool and lack of STEM learning opportunities.
- **K-12 Education**: Of every 100 children born in Washington, only 40 will graduate high school on track for a STEM-related career. The rest will not be prepared because of poor academic performance, limited proficiency in math and science, or a lack of interest in STEM subjects.
- **Transition to Post-Secondary Education and Training**: Only 22 of every 100 students will pursue STEM-related postsecondary education in Washington. The major factors for this sharp decline include the lack of capacity in the state's higher education system, students' disinterest in STEM or in attending an in-state university, and student inability to afford college and STEM training opportunities.
- **Postsecondary Education**: Of those 22 STEM-major students who do enroll in college, only 13 will graduate from a two- or four-year college with a STEM-related degree. The rest will drop out, switch majors, or fail to complete on time.
- **Career**: Finally, only 9 of every 100 kids born in Washington will ultimately become employees in a STEM-related field in the state. Many others will take jobs outside the state or in fields unrelated to their major, despite local demand.

Low-income students face particularly strong headwinds. Of these students, only 40 percent are ready for kindergarten at the traditional age, 25 percent are prepared for and have the opportunity to take STEM coursework in K-12, 12 percent are enrolled in STEM majors in postsecondary education, 6 percent graduate with STEM-related degrees, and 4 percent enter STEM jobs. There is a potential to at least triple STEM graduation rates among these students by increasing access to high quality STEM programming which would bring their achievement levels closer to those of all other students. Targeted interventions and access would have the dual effects of reducing the STEM jobs gap in Washington State and helping to break the cycle of poverty for low-income students in the state.

If Washington invests in STEM Education, it could change the lives of thousands of students and fuel economic growth in our state. There is no single solution to this problem. Washington must invest in multiple strategies to improve education and training across the spectrum: early learning, K-12, post-secondary and workforce education and training, and career preparation.

STEM FRAMEWORK FOR ACTION AND ACCOUNTABILITY

To address the challenges facing our state with respect to STEM education, a state-wide Framework for Action and Accountability ("Framework") was developed and adopted by the Governor's STEM Education Innovation Alliance.[6] The STEM Framework is a research-based tool developed to support greater coordination, smarter investments, and clear results. Under the Framework, the vision is for all Washingtonians to have the STEM skills necessary to live a life of opportunity and success in the state's thriving innovation economy and democratic society. Our goal is for Washington State to lead the nation in STEM literacy for all and to create a diverse, world-class workforce. The Framework was developed to help measure and track progress towards meeting our goals.

[6] A summary of the Framework for Action and Accountability can be found here: http://www.washingtonstem.org/STEM/media/Media/STEM%20Policy/WASTEM-excSummary-final.pdf

The Framework identifies four key areas to show our progress:

- Early learning through high school students;
- Early learning through high school educators;
- Post-secondary, workface training, and employers; and
- Aligned systems - Washington STEM stakeholders/partners capacity to establish and accelerate shared STEM education and workforce goals.

A critical component of the Framework is the ability to track and measure short- and long-term progress towards reaching our goals. A measurement system via a web-based STEM Talent Supply and Demand data dashboard is under development to help track our progress over time. The STEM Talent Supply and Demand Dashboard will be publically available next year.

The Framework is already being used by stakeholders promoting STEM. The Framework is expected to accelerate the impact in our state by:

- Aligning STEM efforts across the state of Washington against a common vision, shared goals, and clear indicators;
- Improving our return on investment;
- Providing for strategic planning and a measurement tool for STEM stakeholders in the state;
- Creating a common research and development agenda to test, identify, and spread promising practices; and,
- Informing policy development and implementation.

MEASURING OUR PROGRESS

Our Governor has been a leader in advancing STEM education in the state, for example, in recently issuing Governor Proclamations for Computer Science Week (December 2014) and Environmental Education Week (April 2015), and challenging local schools and youth serving organizations to participate in activities such as the Hour of Code. In addition, Governor Inslee is the current Chair of the Education and Workforce Committee with the National Governor's Association. In that role he will help shape federal policy in the areas of early childhood, K-12, and postsecondary education and workforce development. We thank the Governor for his leadership and encourage continued efforts to engage with key stakeholders to communicate the importance of STEM in Washington.

In addition, we believe through a variety of budget and policy initiatives, our state is on track to make excellent progress in STEM in the future. Important work underway we support include career and college readiness efforts such as: kindergarten readiness, Common Core State Standards, Next Generation Science Standards, Smarter Balanced assessments, dual credit/dual enrollment coursework, and computer science education programs. We believe that these reforms move our state toward rigorous expectations and opportunities for all of our students.

We have more progress to make if we are to be successful in reaching our goals. The Framework described above and the measurement system built to track its progress (STEM Talent Supply and Demand Dashboard – see Appendix A for more details) allow us to present data and trends on STEM progress in our state. Below, we summarize our progress in key areas as well as the challenges that remain:

Raising awareness about STEM is key to STEM literacy and access to economic opportunities in our state; and, the good news is that knowledge of the term STEM has been growing in the last two years.

- According to a survey of Washington state residents conducted by the Washington STEM organization, in 2015 about 50% of Washington voters had heard of the term STEM, up from 32% percent in just two years.

Interest in STEM at early ages, an important key to increasing the number of students pursuing STEM-related fields, has increased slightly since 2010.

- Among Washington SAT test takers (high school-age students), about 28% indicated an intention to pursue a STEM major or field in 2014, up from 25% in 2010.

Success in education, particularly in STEM subjects such as math, is affected by preparedness, especially in the early stages, but Washington has a ways to go to ensure that all students are meeting standards.

- In 2014-15 only about half (52%) of Washington's kindergartners met the math standard (from WAKIDS).
- In 2013-2014 about 64% of 5th graders met the standard on the MSP math test (WaKIDS), up from about 54% in 2009-10.
- On the Smarter Balanced Assessment, a little less than half (48.1%) of Washington students assessed at 5th grade met the math standard in 2014-2015. And, at 8th grade 46.1% of students assessed met the math standard. For low income populations, the problem is especially acute: Only 31% of low-income children met the standard on kindergarten math readiness in 2014-2015. At 5th grade, about half of low-income children met the math standard on the MSP compared to children who are not low income (76% in 2013-2014).

Readiness for post-High School training and education is also key to meeting the demand for STEM-trained workers. In particular, readiness in the field of computer science is of critical importance to meeting future employer demands. Today, only about 27 districts in the state offer Advanced Placement (AP) computer science.

- In 2015 about 11% (27) of Washington School Districts (and 47 high schools within those Districts) offer AP Computer science. Less than 1% of students in the high schools where AP computer science is offered take the AP course and receive credit. Among those with students who took the AP test in 2014 (1,048 students), about 66% scored 3 or above.[7] Of students participating in AP computer science state-wide, less than 20% are low income (2015).
- Females and students of color are underrepresented in STEM fields, including computer science. Of all students enrolled in AP Computer Science in the state, only 22% are female (2015). Yet, equal percentages of females and males who take the AP test score 3 or better on it (66% in 2014).
- And, there is limited access to AP Computer Science in Washington's rural areas: AP Computer Science offerings are heavily focused in the Seattle urban area, with limited availability elsewhere in the state.

Ensuring the supply of graduates from post-secondary institutions with degrees and credentials in STEM fields is critical to our state's future success. In our state, less than 20% of college graduates have a STEM degree.

- In 2013-14 about 18% of graduates from post-secondary institutions graduate in a STEM field. Among those graduating in a STEM field, most are male (61%) and not low income (83%).
- Only 17% of all STEM degrees awarded are to low income students (2013-2014) compared to 83% of students who are not low income.
- Only 39% of STEM degrees awarded are to females (2013-2014) compared to 61% of males.

Aligning STEM education programs with workforce needs of key economic sectors is necessary for the growth of our economy. This includes ensuring that we have an adequate supply of STEM-trained workers in Washington to meet the demand of employers and understanding the potential gaps. Today, the answer is clear. There isn't enough supply of STEM workers to fill employer demand for these skills; and the gap is especially acute for employers seeking individuals with computer science degrees and skills.

[7] For a score of 3 or above, a student may receive college credit.

- In 2015, there was a shortage of over 20,000 employees that were needed to fill Washington STEM jobs. The vast majority of these unfilled jobs[8] were in Seattle/King County. The biggest gaps were in computer and mathematical occupations and health care (Employment Security Department).
- At the baccalaureate level, degree production in the health, computer science, engineering, and other STEM fields has increased in the last several years. Health sciences degree completions grew -- increasing by nearly 35% from 2007 to 2012. Degree production in the fields of engineering and related technology (27.4%), science and mathematics (28.4%), and computer science and information technology (13%) also grew substantially during this same time period.

Despite progress in recent years, the largest gaps between degree production and employer demand at the baccalaureate and graduate levels are in the fields of computer science and engineering. In computer science, demand exceeds the current rate of degree production by 146%.

RECOMMENDATIONS

This section outlines the priority recommendations from the Governor's STEM Education Innovation Alliance for improving STEM in our state. Important work underway in our state that we support include career and college readiness efforts such as: kindergarten readiness, Common Core State Standards, Next Generation Science Standards, Smarter Balanced assessments, dual credit/dual enrollment coursework, and computer science education programs. We believe that these reforms move our state towards rigorous expectations and opportunities for all of our students. Our recommendations are as follows:

1 Fund College in the High School courses for more low income students in STEM-related courses [BUDGET REQUEST: $5M].[9]

Students in our state need to be prepared for college level course work in STEM fields. One mechanism for achieving this is providing for dual credit /dual enrollment coursework. Dual credit allows high school students in our state to enroll in college courses for credit prior to graduation and the credits earned can be applied toward high school and college graduation and can be transferred to other colleges or universities. Students who complete dual credit courses are more likely to complete high school and continue on successfully to college. We support the College in the High School policy passed last year in HB 1546. We are aware of budget constraints, however, so if additional funding is available, we strongly support (in the following order of priority): 1) funding for dual credit for all students in the state; 2) funding for dual credit for all students in STEM-related courses; and 3) funding for students receiving free- and reduced lunch for all dual credit available.

2 Increase funding for the MESA program and expand it from 6 Community Colleges to 12 Community and Technical Colleges this session [BUDGET REQUEST: $1.5M], then to 34 CTC's in the following biennium [BUDGET REQUEST: $4.3M].

The MESA program has successfully provided community college students with innovative, hands-on opportunities in mathematics, basic and applied science, and engineering in both formal and informal settings. With a STEM focus, MESA successfully targets underrepresented minorities and women and provides this support and enrichment to at-risk and economically disadvantaged students leading to higher rates of enrollment in and completion of STEM courses and degrees. Specifically, we support increasing the amount for MESA college sites to $125,000 (from $58,000) and doubling MESA from 6 Community Colleges to 12 Community and Technical Colleges this session **[BUDGET REQUEST: $1.5M]**. In addition, we endorse The State Board of Community and Technical Colleges' request to increase the amount for MESA college sites to $125,000 for all 34 community and technical colleges in the following biennium **[BUDGET REQUEST: $4.3M]**.

[8] Unfilled jobs refers to job vacancy to describe positions that were open for more than 3 months.
[9] OSPI's estimate is $7,462,975 to fully fund the college in the high school program authorized in HB 1546 in the current year. $2,864,000 was provided in the budget so the gap in the current year would be approximately $5M if to fund this next year (16-17 academic year).

3 Invest in educators' endorsements in computer science teaching by providing professional development opportunities so that they can nurture student interest in computational thinking in preparation for post-secondary programs and good jobs in this high demand field [BUDGET REQUEST: $1M].

Employers in our state know that the demand for computer science graduates is at an all-time high, yet they lack the ability to fill these jobs with graduates from our state's top programs. Moreover, computer science skills and computational thinking are critical to enabling Washington state citizens to be part of a 21st century STEM capable workforce and to reach our goal of building STEM literacy for all. Meeting this demand will require investments including exposing K-12 students to computer science and computational thinking. Our goal is for every student to experience computer science learning as a part of his/her education. As well, we recommend that EVERY classroom in the state participate in the Hour of Code this year during Computer Science Education week in December. Previous efforts have made good progress towards this end and we recommend building on these efforts. Recently enacted legislation has included the following advances:

- Two years ago, schools were required to give academic credit for AP computer science.
- Career and technology (CTE) credit equivalencies that earn math or science credits.
- This past session, HB 1813 directed development of computer science learning standards and teacher preparation.

We can build upon these successes by supporting our educators in computer science with professional development opportunities. Teachers with computer science endorsements are key to introducing our students to computer science. We advocate for funding computer science educator grants and scholarships as incentives for teacher preparatory programs in higher education to create courses for pre-service and certificated teachers to learn computer science, with targeted support for teachers who are working in schools serving low income and underrepresented students in STEM. Our specific recommendation is to consider accelerating the path to expand computer science opportunities for all students in Washington by investing more in the computer science endorsement educator scholarships legislated last year. The Legislature invested $2M in 2015-2017 with the assumption that with a 1:1 match and $2M every biennium, all students would be reached by 2025. We recommend accelerating that path by investing an additional $1M now in this supplemental budget.

4 Endorse the Washington Student Achievement Council's (WSAC) request to sustain the Governor's STEM Alliance and the STEM Data Dashboard [BUDGET REQUEST: $155,000].

To date, the activities of the Governor's STEM Education Innovation Alliance and the development of the STEM data dashboard have been supported through a National Governors Association grant and contributions from the Washington Student Achievement Council (WSAC) and Washington STEM. A supplemental budget request has been submitted for $155,000. This funding will allow the WSAC team to continue providing necessary guidance for the work of the STEM Alliance. The funds will support salary, benefits and expenses for one FTE policy associate ($115,000); and provide for Service Contract Expenses for collaborative work with Washington STEM, a nonprofit organization focused on advancing STEM education in the state, which will continue to develop and refine a STEM data dashboard and foster the creation of robust and sustainable industry-education partnerships ($40,000). We support WSAC's request to sustain this important work.

CONCLUSIONS

Unless much more is done to address the STEM education pipeline the costs of failing to address the skills gap will only increase in the years ahead. Many students will continue to leave Washington State to pursue higher education elsewhere, and employers will continue to seek out-of-state and international STEM talent to fill their workforce needs. Without improvement, leading companies may be driven to locate more and more jobs outside of the state. But, with focused effort, our state could be a national leader in STEM education. Washington should seize this opportunity to lead its residents into high-paying jobs and economic prosperity in the future. Action is needed now, and the recommendations set forth in this Benchmark Report Card are critical to making progress on STEM in our state.

Appendix A: Washington's STEM Talent Supply and Demand Dashboard

Framework Indicator	Key Questions	Measure	Results
1 STEM awareness in Washington State	Are Washington State residents aware of the term and meaning of "STEM?"	[MEASURE 1] STEM Awareness Definition: Percentage of Washington residents indicating "yes" they have heard of the acronym STEM at the time of the survey, out of a random telephone sample of voters in Washington. Source: WA STEM Survey	Raising awareness about STEM is key to STEM literacy and access to economic opportunities in our state; and, the good news is that knowledge of the term STEM has been growing in the last two years. According to a survey of Washington state residents conducted by the Washington STEM organization, in 2015 about 50% of Washington voters had heard of the term STEM; up from 32% percent in just two years.
Framework Indicator	**Key Questions**	**Measure**	**Results**
2 Student interest in STEM fields	Are Washington high school students interested in pursuing majors that lead to STEM careers?	[MEASURE 2] Student Interest in STEM Definition: SAT test-takers indicating intended college major in a STEM field out of all SAT test-takers that indicated an intended college major. Source: College Board	Interest in STEM at early ages, an important key to increasing the number of students pursuing STEM-related fields, has increased slightly since 2010. Among Washington SAT test takers (high school-age students), about 28% indicated an intention to pursue a STEM major or field in 2014, up from 25% in 2010.
Framework Indicator	**Key Questions**	**Measure**	**Results**
3 Student STEM achievement among PreK-12	How well are we preparing Washington students academically to pursue STEM-related careers? (Early Learning? K-12?)	[MEASURE 3] Early Learning: Kindergarten Readiness [a] [MEASURE 4] K-12: Passing Grade 5 Math [b] [MEASURE 5] Smarter Balanced Assessment Math (3rd – 8th and 11th grade) [c] [a] Number of students meeting standard for readiness in math on WaKIDS out of the number of students assessed for readiness in math on WaKIDS. [b] Number of students meeting standard on the Measurements of Student Progress (MSP) for math in grade 5, out of the total number of students taking the MSP for math in grade 5, including those with "No Score." Source: OSPI [c] Number of students meeting standard for math on Smarter Balanced Assessment for grades 3-8 in 2014-15. Source: OSPI	Success in education, particularly in STEM subjects such as math, is affected by preparedness, especially in the early stages, but Washington has a ways to go to ensure that all students are meeting standards. In 2014-15 only about half (52%) of Washington's kindergartners met the math standard (from WAKIDS). In 2013-2014 about 64% of 5th graders met the standard on the MSP math test (WaKIDS); up from about 54% in 2009-10. On the Smarter Balanced Assessment, a little less than half (48.1%) of Washington students assessed at 5th grade met the math standard in 2014-2015. And, at 8th grade 46.1% of students assessed met the math standard. For low income populations, the problem is especially acute: Only 31% of low-income children met the standard on kindergarten math readiness in 2014-2015. At 5th grade, about half of low-income children met the math standard on the MSP compared to children who are not low income (76% in 2013-2014).

Framework Indicator	Key Questions	Measure	Results
4 Student readiness for college-level study in STEM	How well are we preparing Washington HS students academically to pursue STEM at the post-secondary-level?	[MEASURE 6] AP Computer Science: Availability in Washington Districts [d]; Availability in Washington High Schools [e]; Completion [f]; Score 3 or Above [g]. [d] Number of school districts containing a high school with students receiving credit from an AP Computer Science program, based on having at least one student receiving credit in AP Computer Science in a given year, out of the number of school districts in the state with high schools. [e] Number of high schools with an AP Computer Science Program, based on having at least one student receiving credit in AP Computer Science in a given year, out of the number of high schools in the state. [f] Number of students receiving credit for AP Computer Science from OSPI Grade History. [g] Number of students passing with a score of 3 or higher in AP Computer Science out of the total number of students taking the AP Computer Science exam. Source: OSPI and College Board	Readiness for post-High School training and education is also key to meeting the demand for STEM-trained workers. In particular, readiness in the field of computer science is of critical importance to meeting future employer demands. Today, only about 27 Districts in the state offer Advanced Placement (AP) computer science: In 2015 about 11% (27) of Washington School Districts (and 47 high schools within those Districts) offer AP Computer science. Less than 1% of students in the high schools where AP computer science is offered take the AP course and receive credit. Among those with students who took the AP test in 2014 (1,048 students), about 66% scored 3 or above.[10] Of students participating in AP computer science state-wide, less than 20% are low income (2015). Females are underrepresented in STEM fields, including computer science. Of all students enrolled in AP Computer Science in the state, only 22% are female (2015). Yet, equal percentages of females and males who take the AP test score 3 or better on it (66% in 2014). And, there is limited access to AP Computer Science in Washington's rural areas: AP Computer Science offerings are heavily focused in the Seattle urban area, with limited availability elsewhere in the state.

Framework Indicator	Key Questions	Measure	Results
5 21st century skills	Have students in our state mastered the skills, knowledge and expertise to succeed in work and life in the 21st century?	21st century skills Under Development	Not available at this time.

Framework Indicator	Key Questions	Measure	Results
6 PreK-12 STEM classes led by effective educators	How effective are educators/ teachers in inspiring and teaching students in STEM subjects?	PreK-12 STEM classes led by effective educators Under Development	Not available at this time.

[10] For a score of 3 or above, a student may receive college credit.

Framework Indicator	Key Questions	Measure	Results
7 Teachers and school leaders with STEM-related degrees	Do our educators, teachers and school leaders have the needed degrees and credentials to support student learning in STEM?	Teachers and school leaders with STEM-related degrees Under Development	Not available at this time.

Framework Indicator	Key Questions	Measure	Results
8 Graduates from postsecondary institutions with degrees in STEM fields	What is the supply of STEM graduates from post-secondary institutions?	[MEASURE 7] Post-secondary: Degree Completion [h] [h] STEM Degree completions by completion year, out of the total degree completions of all kinds by completion year. Source: PCHEES - OFM	Ensuring the supply of graduates from post-secondary institutions with degrees and credentials in STEM fields is critical to our state's future success. In our state, less than 20% of college graduates have a STEM degree: In 2013-14 about 18% of graduates from post-secondary institutions graduate in a STEM field. Among those graduating in a STEM field, most are male (61%) and not low income (83%). Only 17% of all STEM degrees awarded are to low income students (2013-2014) compared to 83% of students who are not low income. Only 39% of STEM degrees awarded are to females (2013-2014) compared to 61% of males.

Framework Indicator	Key Questions	Measure	Results
9 Alignment of STEM education programs with workforce needs of key economic sectors	Do we have an adequate supply of STEM trained workers in Washington State to meet the demand of employers? If not, how large is the gap now and what is it projected to be in the future? What STEM occupations/fields are in highest demand?	[MEASURE 8] Skills Gap [i] Definition: Demand for workers in STEM occupations (growth and replacement openings) minus the supply of students expected to enter STEM selected occupations. Source: WSAC (IPEDS/ESD)	Aligning STEM education programs with workforce needs of key economic sectors is necessary for the growth of our economy. This includes ensuring that we have an adequate supply of STEM-trained workers in Washington to meet the demand of employers and understanding the potential gaps. Today, the answer is clear. There isn't enough supply of STEM workers to fill employer demand for these skills; and, the gap is especially acute for employers seeking individuals with computer science degrees and skills: Despite progress in recent years, the largest gaps between degree production and employer demand at the baccalaureate and graduate levels are in the fields of computer science and engineering. In computer science, demand exceeds the current rate of degree production by 146%.

Framework Indicator	Key Questions	Measure	Results
9 Alignment of STEM education programs with workforce needs of key economic sectors	Geographically, where are the STEM job opportunities in the State?	[MEASURE 9] ESD Jobs, "Gap" [j] Definition: Difference between demand for STEM workers, given by average (across months) Conference Board online job postings, and average (across months) supply of STEM workers, given by WA Employment Security Department unemployment claimants plus Worksource customers. Source: WA ESD	In 2015, there was a shortage of over 20,000 employees that are needed to fill Washington STEM jobs. The vast majority of these unfilled jobs were in Seattle/King County. The biggest gaps were in computer and mathematical occupations and health care. (Employment Security Department).
	What industry sectors should be targeted in order to meet the demand for STEM workers?	[MEASURE 8] Skills Gap [i] and [MEASURE 9] ESD Jobs [j] Definition: same as above.	At the baccalaureate level, degree production in the health, computer science, engineering, and other STEM fields has increased in the last several years. Health sciences degree completions grew -- increasing by nearly 35% from 2007 to 2012. Degree production in the fields of engineering and related technology (27.4%), science and mathematics (28.4%), and computer science and information technology (13%) also grew substantially during this same time period.

Framework Indicator	Key Questions	Measure	Results
10 State and local systems to support STEM success Collective IMPACT	What progress have we made collectively to enact state-wide policy change, disseminate best practices and share data, and leverage funding opportunities?	State and local systems to support STEM success Measures (examples) to be developed in the future: Leveraging Funding: Evidence of increased funding and alignment of existing resources to support a common agenda and goals Progress: State-wide policy change/enactment; Adoption of and effective implementation of evidence-based STEM policies and practices; Identification and transfer of best practices across the state. Systems Change: Creation and alignment of statewide STEM Network to improve student outcomes; Shared measurement system Stakeholder Value: Satisfaction with progress and backbone organization	Not available at this time.

GOVERNOR INSLEE'S STEM EDUCATION INNOVATION ALLIANCE

Meeting of the Alliance - December 1, 2015 - Microsoft Conference Center (Redmond)

ATTENDING

Affiliation	First Name	Last Name	Position Title	Organization	Email
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REGRETS

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