# The State of Washington

# Proclamation

**WHEREAS,** the field of computer science and computing technology reimagines how people interact with each other and the world around them, and is transforming industries, creating new fields of commerce, driving innovation in science, and bolstering opportunity for Washingtonians; and

**WHEREAS,** Washington is a national leader in Science, Technology, Engineering and Math (STEM), ranking second nationally in the concentration of STEM jobs and first in the concentration of software companies; and

**WHEREAS,** giving students the chance to participate in computer science activities exposes them to the opportunities the field offers and provides critical thinking skills that will serve them throughout their lives; and

**WHEREAS,** all students deserve access to the qualified educators, technology, and age-appropriate curriculum needed to learn computer science at the elementary and secondary levels of education; and

**WHEREAS,** the field of computer science has significant equity barriers to address and Washington must encourage opportunities for females and underrepresented minorities in STEM; and

**WHEREAS,** the state of Washington and our school system, along with community partners – such as Washington STEM, code.org, Technology Education and Literacy in Schools (TEALS), Washington Mathematics, Engineering, Science Achievement (MESA), and other non-profits – have worked to increase access to computer science education throughout the state by providing professional development, donating technology and inspiring students; and

**WHEREAS,** the state of Washington has developed high-quality statewide computer science standards in line with nationally-recommended computer science standards;

**NOW, THEREFORE,** I, Jay Inslee, Governor of the state of Washington, do hereby proclaim December 5-9, 2016

## Computer Science Week

in Washington, and I encourage all schools and students to participate in the Hour of Code and other computer science teaching and learning opportunities.

Signed this 23rd day of November, 2016

Governor Jay Inslee

**WASHINGTON STATE
STEM EDUCATION
INNOVATION ALLIANCE**

# 2017
# STEM Education
# Report Card

Additional information on STEM educational achievement
and workforce needs in the state can be found in Washington's
STEM Talent Supply and Demand Dashboard **(stem.wa.gov)**

WASHINGTON STUDENT
**ACHIEVEMENT COUNCIL**
EDUCATION · OPPORTUNITY · RESULTS

# THE STEM IMPERATIVE

Washington has one of the most dynamic economies in the nation, propelled by explosive growth in our STEM-driven technology sector. To allow the vital, innovative companies in this sector to grow and thrive, we must continue to develop the state's STEM education system to meet expanding and evolving workforce needs. **While moderate progress has been made in some areas in recent years, overall improvement in the STEM pipeline remains a statewide imperative.**

# THE CHALLENGE



**Our technology and innovation sector employers have a critical need for STEM-educated workers.**

- Washington state **ranks #1 nationally** in the concentration of STEM related jobs,
- **#3 in STEM job growth**, and
- **#1 for Tech Innovation Capacity**



**But STEM training and degree production in Washington is not keeping pace with demand.**

- **Washington ranks low** in the production of computer science, engineering and health degrees relative to job openings in those fields.
- **Ranks 46th in the nation** and **next to last** among the top fifteen high-tech-intensive states in the proportion of high school graduates who go directly to college.

**Thus employers are forced to import STEM-educated workers trained in other states.**

- Washington is the **2nd largest importer** of degrees among tech states, and
- **1st among all 50 states** as a proportion of population

# KEY STEM PROGRESS INDICATORS

## STEM awareness.

In 2015, approximately 50% of Washington voters had heard of STEM, an increase from 32% in 2013.

## Interest in STEM studies among high school students.

In 2016, approximately 31% of Washington SAT-takers indicated an intention to pursue a degree in a STEM major, an increase from 25% in 2010.

## STEM achievement: Pre-school through K-12.

**Kindergarten readiness in math**

About 61% of incoming kindergarteners demonstrated "kindergarten readiness" in math among students assessed by WaKIDS, 2015-16.

**Smarter Balanced Assessment math scores, 2015-2016:**

- At the 3rd grade level, more than one-half **(58.9%)** of students met the math standard.
- At the 5th grade level, the percentage meeting standard was **49.2%.**
- At the 8th grade level, the percentage meeting standard was **47.8%.**

**Student readiness for College-Level studies in STEM subjects:**

*AP Computer Science:*

- Only 11% (27) of Washington School Districts out of 295, and 42 high schools out of 760 currently offer AP Computer Science.

11%

5%
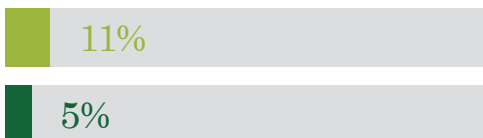
- Among districts where AP Computer Science is offered, less than 1 percent (1,205 students) completed the course in 2014 and of those 66% received a score of 3 or higher on the exam, consistent with college credit.

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

**We have made progress in raising the number of Washington higher education graduates earning degrees in STEM fields, but the percentage is still too low to meet workforce needs.** More than one-fourth **(29%)** of under-graduate degrees awarded at Washington **public baccalaureate** institutions in 2015 were in STEM subjects, **up from 21.4%** in 2010.

29%  ↑ 7.6%

**STEM degree completions have shown steady increases in recent years (2007 – 2013).**

*At the Associate Level:*

- Degree completions in Health fields increased by 63%, in STEM fields by 59%.

↑ 63%
Health

↑ 59%
STEM
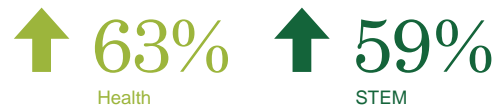
*At the Baccalaureate Level:*

- Degree completions in Computer and Information Sciences grew by 38%, in Engineering, Engineering and related fields by 27%, and in Health by 29%.

| | |
|---|---|
| Computer & Information Sciences | 38% |
| Engineering, and related fields | 27% |
| Health | 29% |
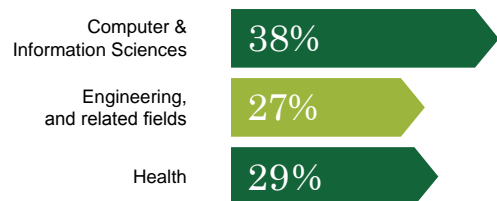
*At the Graduate Level:*

- Degree completions in Computer and Information Sciences more than doubled. Completions in Health grew by 40% and in Engineering and Architecture by 18%.

| Computer & Info. Sciences | Engineering, and related fields | Health |
|---|---|---|
| 2x growth | 40% growth | 18% growth |
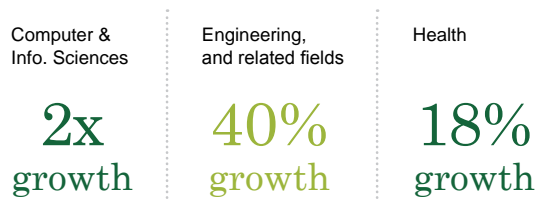
**But rapidly growing workforce demand is still outpacing STEM degree production.**

- There is a widening gap between projected annual job openings for computer scientists and the number of graduates in Washington prepared to fill them. The gap has been growing rapidly for the last decade.

- Projections for the years 2018 – 2023 estimate that:
  - The number of annual job openings in **Computer Science** at the Bachelor's and Graduate levels will exceed the number of graduates completing Computer Science degree programs by 140%. On an annual basis, there will be 3,800 more job openings in computer science than there are graduates completing degree programs.

| Jobs | +140% |
|------|-------|
| Graduates | |

**3,800** Unfilled jobs

= 100

  - The number of annual STEM job openings in **Engineering** will exceed the number of graduates completing by 31%.

Graduates

Unfilled jobs (+31%)

## Underrepresented populations in STEM.

**A gender imbalance in STEM achievement tends to widen as students move through the pipeline.**

- Among pre-K students, a higher percentage of girls than boys are demonstrating "kindergarten readiness" in math in WaKIDS assessments (61% of girls compared to 60% of boys in 2015-2016).

61%    60%

- As they move through the education pipeline, however, interest and achievement in STEM tends to fade for female students. 80% of all students completing AP Computer Science are male.

80%

- Male students complete STEM degrees in much greater numbers than female students. In 2014, 62% of all students completing undergraduate STEM degrees in Washington were male.

62%

**Students from low income families are disadvantaged at all stages in the STEM pipeline.**

- Among low-income pre-K students, only 49% demonstrated "kindergarten readiness" in math in 2015-16.

$    49%    $

- In 2014, among students completing AP Computer Science courses only 14% were from low-income families.

$    14%    $

# POLICY RECOMMENDATIONS

The STEM Education Innovation Alliance is committed to devising innovative policies that will enhance STEM education and career pathways, advance economic development, meet our state's urgent workforce demands, and provide opportunities for more Washingtonians to compete for jobs in this vital high-wage sector.

## Increase support for underrepresented populations in STEM fields.

- Expand opportunities to study math, science, and technology, such as those offered by Technology Access Foundation (TAF) courses.
- Invest in MESA to make it available at every Community College.
- Continue to support the Washington State Opportunity Scholarship.
- Provide greater access to advanced coursework, including dual credit programs, necessary for success in STEM majors.

## Ensure our education system is STEM ready by providing resources to schools and teachers to provide a rich STEM experience for students, including quality computer science instruction.

### Early Learning and Elementary
- Provide toolkits that link preschool and K-12 mathematics, support intensive teacher learning, and identify effective parent/family engagement resources.
- Enhance Teacher Learning Supports to encourage implementation of engineering practices and design challenges related to local industries.
- Create incentives to expand opportunities for students to develop computational thinking skills.
- Expand professional learning opportunities for K-8 teachers.

### Middle and High School
- Make rigorous computer science instruction, such as AP Computer Science, available to students in every high school.
- Expand professional learning opportunities in computer science, including innovative programs like Technology Education and Literacy in Schools, Code.org, and the Pacific Education Institute.
- Increase opportunities for middle school students to earn high school credit in STEM fields.
- Broaden professional learning opportunities in STEM for educators and school leaders.
- Increase availability of computer science and other STEM-related endorsements for pre-service and in-service teachers.

### Postsecondary
- Fund additional Computer Science and other high employer demand STEM enrollments.
- Maintain stable and predictable tuition and support state aid programs that address access and completion challenges for low-income students.

## Expand opportunities for career-connected learning.

- Provide stipends or student aid for pre-apprenticeship students entering the Registered Tech Apprenticeship program developed by Washington Technology Industry Association.
- Expand apprenticeship opportunities into other high demand technology fields.
- Provide industry standard equipment and connectivity in all computer science classrooms.
- Enhance guidance and support through high school and beyond planning, advisory courses, work integrated learning opportunities, and jobs for Washington Grads.
- Increase funding for State Work Study and encourage colleges to create new mentor partnerships with K-12 schools.

**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* **ranks 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<br>*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<br>*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. |

**<u>Where are we today?</u>**

• 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

*After reviewing the draft document, "Vision 2021: Investing in a Future Ready Washington, Strategic Action Plan prepared by the Governor's STEM Education Innovation Alliance," please send in a succinct report about your recommendations, using this format.*

**Please return feedback by December 2, 2016.**
*Note:  Success Indicators will be filled in once Action Items are finalized.

1. **QUICK FACTS:**
   Name(s):
   Date:

2. **PRIMARY EMERGING THEMES:**

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3. **QUESTIONS:**
   • 
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4. **RECOMMENDED QUOTES/STATISTICS FOR INCLUSION:**
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5. **SPECIFIC NOTES:**

## EXECUTIVE SUMMARY:

| KEEP: | REMOVE: | ADD: |
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## THE STEM IMPERATIVE FOR WASHINGTON STATE:

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## BACKGROUND ON EFFORTS UNDERWAY:

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## CALL TO ACTION:

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*GOAL 1: Inspire youth through career connected and real-world STEM learning opportunities.*

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

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*GOAL 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.*

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*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.*

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*GOAL 5: Raise public awareness and support for STEM.*

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# Career Connected Learning in Washington State:
## Learnings and Recommendations

### Executive Summary

There are great jobs in Washington but too many of our youth are unaware, uninspired and unprepared to compete for them. Most of these great jobs require a postsecondary credential and/or advanced training beyond high school. But the education and training pathways to those great jobs are not transparent to students and families, well-aligned to employer needs, nor easy to navigate. As our state's youth lose out on these pathways to economic opportunity, businesses spend time, money and resources to recruit talent from elsewhere, and ultimately our community prosperity and vitality suffers.

Washington urgently needs a systemic approach for developing, promoting and implementing education, apprenticeship and training pathways aligned to the great jobs the state's employers are creating.

This document provides historical and situational context about career-connected learning in Washington's education system so that we can better understand the landscape and build from the strengths and opportunities that currently exist. It highlights a few programs in state and out of state that can serve as sources of information and case studies. In particular, it summarizes the key learnings from Microsoft's recent visit to Switzerland where the team spent a day and a half learning about the highly successful Swiss youth apprenticeship model that included meetings with employers, educators, policy makers, parents and apprentices. And finally, it offers recommendations for immediate next steps including a visit to Colorado to learn how they are now adopting the Swiss youth apprenticeship model in their state, a public-private partnership to define targets, invest in high-impact models such as youth apprenticeships here in Washington and catalyze systemic changes throughout the education system.

### Preparing People for Great Jobs, Across the State

We have the opportunity to build on current education and workforce systems to ensure that individuals can better prepare themselves for the great jobs in Washington State's evolving economy.

For more than a decade, Washington state and the country as a whole have been on a mission to modernize their education system to shift from one that was expected to prepare *some* young people for education beyond high school college to a system that was expected to prepare *all* young people for some form of post-secondary education or training. The opportunities for young people with high school diplomas or less continue to shrink while those for young people with two- or four- year degrees are increasing. The goal of these efforts has been to eliminate the systematic "tracking" of students into separate college or vocational education pathways. Such tracking would often along racial, gender, geographic and income-level lines, and could pre-determine future job opportunities and earning potential for those students. The vocational track was overproducing students for lower-wage, declining job market while the college track was under-producing students prepared for family-wage, growing job markets.

While this focus has led to more students *overall*, as well as more students from underserved and underrepresented backgrounds, graduating from high school prepared for post-secondary success, it has also led to some unintended consequences:

- Investments and updates in vocational, career-technical education (CTE) in our schools declined, resulting in many of the programs being reduced in size and scope and unable to keep up with current labor market demands. Educators may be less aware of how what they are teaching applies to the real-world job expectations and experiences of today. Young people are too often expected to make decisions about their future without sufficient exposure to careers or college experiences.

- As the economy changed and vocational education fell in disfavor, the dynamic between K-12 vocational offerings and actual and projected growth across sectors diminished. Currently career education's link to the market is broken and what is offered is poorly aligned with compelling, high growth sectors and careers.

- Young people that aren't interested in or ready for college can become discouraged in high school because they don't see a path forward for themselves. Some believe this perpetuates the decision by some of these students to drop out of high school. In Washington State the four-year high school completion rate for the class of 2015, the most recent year for which data are available, was 78.1 percent. But for students of color it was much lower, including 69.6 percent for Hispanic students, 68.8 percent for African American students, and 56.4 percent for Native American students.[1]

- The academic requirements for students to graduate from high school prepared for college, often limit their ability to participate in hands-on, work-based, life-skills learning opportunities which can be very valuable in preparing for the workforce. And if students have dropped out of high school, without these life skills, their ability to attain and progress on the job is limited.

- And now, our economy has many high-skilled jobs - that don't require a college degree but do require a post-secondary credential that are going unfilled.

Washington state is producing more middle-wage and high-wage jobs than it can fill. In fact, a recent report by Boston Consulting Group states that Washington will have 740,000 job openings over the next five years, a number that exceeds our historic growth rate and that will be triple the national average over that period. This job growth is happening across the state and across many different job sectors including healthcare, construction, carpentry, freight processing, utilities, accounting, sales, shipbuilding, computer science, IT services and many others. The faster growing "pathway" middle-wage and "career" high-wage jobs increasingly will require a post-secondary degree, certificate or other credential. About two-thirds of those in the pathway jobs will have such a credential and more than 90 percent of those in career jobs, the ones that provide the greatest compensation and upward mobility, will have one. But today, only 31 percent of Washington high school graduates earn such a credential by their 26th birthday[2].

Our system needs to enable all young people to fulfill their full potential and reach their goals – to obtain and keep the great jobs our local employers are producing. It needs to be more aligned to what the economy requires. And it needs to better help young people discover the right opportunities for them and the pathways that prepare them. While the economy and the job market constantly evolve, there are a few things most employers agree on:

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[1] http://www.k12.wa.us/dataadmin/pubdocs/GradDropout/14-15/2014-15GraduationDropoutStatisticsAnnualReport.pdf
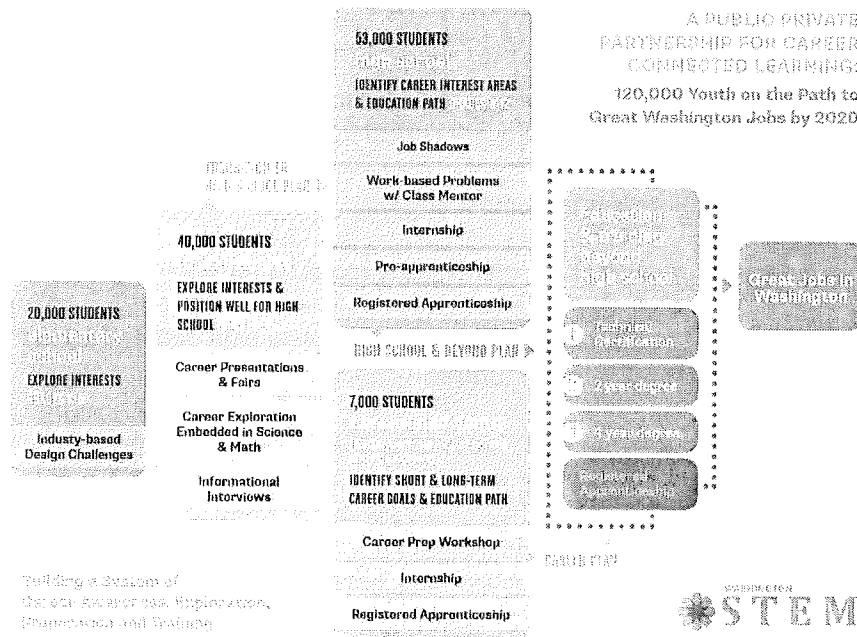[2] http://www.waroundtable.com/wa-kids-wa-jobs/

1. The uniquely human skills of problem solving, lifelong learning, empathy, communication, collaboration, critical thinking and reasoning are critical for hiring and job success.

2. Digital fluency is a basic requirement for almost any job.

3. Post-secondary credentials or degrees are increasingly required for family-wage jobs.

4. Backgrounds and skills in STEM and healthcare fields are in very high demand across Washington state, and will continue to be well into the future.

5. There are multiple pathways to great jobs – and many of them are underutilized, such as apprenticeships.

*We can build on the strengths and minimize the weaknesses associated with both the education and workforce system – to build a career- connected learning system that prepares people for great jobs.*

## Components of Career-Connected Learning – program rich, but systems poor

Washington STEM has made career-connected learning one of their top priorities. They embarked on a learning tour to understand what was happening across the state. They found programs happening in every region – at every level, for every sector. But they also found significant variation among these programs – emerging and established; low-cost and high- cost; rigorous and not rigorous; well-established and newly formed; grassroots driven and centrally administered; aligned to labor needs and not aligned; in-school and out-of-school, etc. At the end of the process, the concluded that Washington state's career-connected learning opportunities is program rich, but systems poor.

By working with program and policy leaders throughout their 10 regional networks, Washington STEM has produced a set of definitions and a roadmap for a more seamless system for career awareness, exploration, preparation and training - everything from in-school career talks to registered apprenticeships to university degrees.

The diagram shows a career-connected learning roadmap with the following readable elements:

**63,000 STUDENTS** — IDENTIFY CAREER INTEREST AREAS & EDUCATION PATH
- Job Shadows
- Work-based Problems w/ Class Mentor
- Internship
- Pre-apprenticeship
- Registered Apprenticeship

**HIGH SCHOOL & BEYOND PLAN →**

**7,000 STUDENTS** — IDENTIFY SHORT & LONG-TERM CAREER GOALS & EDUCATION PATH
- Career Prep Workshop
- Internship
- Registered Apprenticeship

**40,000 STUDENTS** — EXPLORE INTERESTS & POSITION WELL FOR HIGH SCHOOL
- Career Presentations & Fairs
- Career Exploration Embedded in Science & Math
- Informational Interviews

**20,000 STUDENTS** — EXPLORE INTERESTS
- Industry-based Design Challenges

**A PUBLIC PRIVATE PARTNERSHIP FOR CAREER CONNECTED LEARNING:**
120,000 Youth on the Path to Great Washington Jobs by 2020

Great Jobs in Washington

WASHINGTON STEM

*The opportunity now is to inventory existing programs and identify gaps in quality, accessibility, capacity and relevancy across the roadmap. And then to develop a coherent strategy for how the state can create a seamless system.*

## Washington's rich history of apprenticeships intersecting with today's economy

Today there are over 12,000 people in *registered* apprenticeships within 200 occupational tracks in our state. The majority of these registered programs are run or associated with trade unions. These are highly regulated by the state's Labor & Industries agency and all employer participants must become registered training agents with the state. Most participants are over 18 – with the average being 27 – and have a high school diploma or a GED. Upon completion of the required supplemental classroom instruction and the required structured on-the-job training, apprentices earn a nationally recognized certification.

The supplemental classroom instruction is mostly provided by labor-operated training councils while the on-the-job training occurs at union job sites. There are some employers that team with community colleges or technical colleges to deliver apprenticeship programs.

Registered apprenticeship programs are a deeply entrenched, highly coveted, and a significant source of pride to the trades – here in our state, but also nationally. It is a decades-old system that has prepared generations of talent and secured generations of union membership. It is in their best interest to maintain the current system.

In part because of the success of this model (and other successful models outside the US), there is growing interest in expanding the apprenticeship model to more students and in more employment sectors like advanced manufacturing, healthcare and information technology. The benefits make it very attractive for young people – especially those that simply aren't interested in or don't feel ready for attending college:

1. Students are put into a work setting with adults and often receive direct coaching, support and mentorship on job skills and life skills.

2. Many students are more successful in assimilated learning that is more hands-on and applied versus theoretical and academic.

3. Students are paid while they learn.

4. Upon completion, they have a credential that is recognized regionally or nationally and serves as a springboard to a family-wage job.

5. Lowering the age of entry into a family-wage job can provide many young people a strong, stable economic start.

The US Department of Labor has recognized Washington state as a prime place to further grow and test innovative pre/apprentice models. It has awarded the state five grants in King County over the past two years to push models into new sectors or to reach new audiences. The funding source for many of these grants are from the H1B Visa fees. The grants include:

| Program Name | Industry Partners | Training partner | Requirements | Sector | Reach | Funding |
|---|---|---|---|---|---|---|
| Apprenti IT Apprenticeships | WTIA, MSFT | Apprenti, Microsoft | GED, HS diploma | IT | 600 over 4 years | $3.5M |
| TechHire | n/a | LaunchCode, Ada Developer Academy and others | Various – some open to all ages | IT, coding | 2,000 | $3.8M |
| MechaWA Partnership Project | Boeing, AJAC | Everett Community College | GED, HS diploma | Aerospace Manufacturing | | $3.8M |
| Partnership for Advanced Technology Apprenticeships in Manufacturing and Marine Engineering | Vigor Shipyard | South Seattle College | GED, HS diploma | Advanced Manufacturing and Maritime | 1,000 | $4.8M |
| Manufacturing Academy - PreApprenticeship | AJAC | Bates College/Tacoma Public Schools (will expend to 5 more regions) | High School students | Aerospace Manufacturing | 75 | n/a |

*There will be work to do – in collaboration workforce development councils and industry – to define the name, certification, standards, processes and criteria – for models that are similar in approach to existing pre/apprenticeship models.*

## Learning from Others: The Swiss Vocational Education and Training (VET) Program [3]

In the United States most apprenticeship programs require students to be 18 years old and with a high school diploma or GED and are designed to provide some form of post-secondary credential to students who most likely won't pursue a college or university education. In Switzerland, the apprenticeship program starts in high school and prepares students for both a credential and further studies at a college or university.

In Switzerland, 70 percent of young people choose to pursue their education through the Vocational Education and Training (VET) apprenticeship pathway, with the remaining 30 percent choosing a more traditional university pathway. The VET program offers 230 occupational apprenticeship pathways that include further education leading to a credential but often also leading the students to college or university

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[3] Gold Standard: The Swiss Vocational Education and Training System, March 2015; Center on International Benchmarking

degrees.  The country's education, training and labor system is built to support this national model – each pathway's accessibility and capacity, funding and resource investment, social acceptance and prestige are widely recognized and understood by students and employers alike.  The VET system within the Swiss Education System is collectively governed by the Confederation (federal government), the Cantons (the regional governments) and Professional Organizations (business and labor) as set forth in federal legislation.

Based on testing, aptitude and interest, students make their initial choice to pursue the VET pathway during 7th grade and then, between the ages of 13 and 16 they choose their desired occupation and search for their apprenticeship.

Most Swiss employers actively participate in this process, hosting career exploration visits that reach nearly every 8th grader in Switzerland and offering three to four year, paid apprenticeships.  Some 58,000 Swiss companies provide opportunities to more than 190,000 VET students – impressive figures in a country of 8 million.

While in the apprenticeship path, students' education takes place in three places, in three ways:  in traditional classrooms learning core academic subjects (schools); in regional hubs learning sector-specific content and skills (professional skills-centers); and in on-the-job settings learning company-specific content and skills (job-site).

The public sector is responsible for approximately 40 percent of the cost of the VET program – the development and delivery of the school-based and skills-center-based education.  The private sector is responsible of approximately 60 percent of the cost – the development and delivery of the job-site learning and the apprenticeships' wages.

This diagram illustrates the various pathways Swiss students follow:
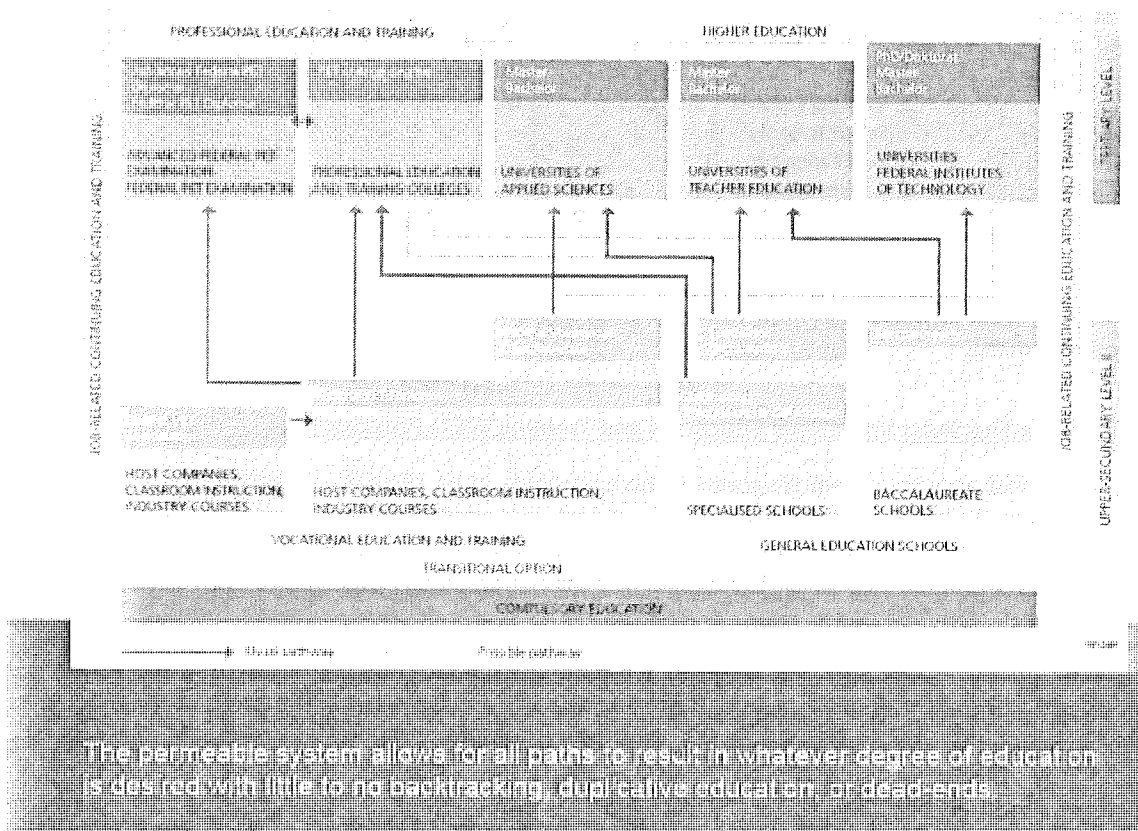
There are clear strengths of the Swiss VET model, including:

1. It is employer- and labor-market-driven, system-wide: Professional organizations representing 230 occupational categories determine quantity, focus, standards and certifications for all apprenticeships. The process is dynamic and continually adapted to meet changing needs of the economy and workforce—each year the number of apprenticeships offered within each occupational category is established based on the projected needs of the job market. These professional organizations and employers create the career-connected learning opportunities offered to all middle school students to help them discover the paths that most interest them.

2. There is a long-standing, effective partnership between the federal government (confederation), local government (cantons) and professional organizations that oversees the quality and outcomes of the system and adjusts it to best meet the needs of students and employers. The responsibilities and costs for both the public sector and the private sector are well known and expected.

3. Each apprenticeship delivers a well-balanced mix between academic and professional skills by trained professionals.

4. Perhaps the hallmark of the Swiss model is the "permeability", accessibility and quality of their entire education system. The choice of a given path is not a permanent decision. Instead, people move between apprenticeship programs and formal education with little friction and little risk. *Professional & technical schools and universities are free in Switzerland for anyone admitted under the age of 48.* Many young people who don't feel ready for college as teenagers pursue the VET pathway before they ultimately pursue college, university or advanced degree programs.

5. The is a high degree of prestige in the VET model – people of all socio-economic backgrounds see it as a viable model to reach their full employment potential. In fact, many c-suite leaders of Swiss companies initially pursued the VET pathway.

6. The shared cost of the model between the public and private sectors creates powerful incentives to ensure businesses see a full return on their investment. Companies cite the VET program as a cost-effective process for recruiting, training and retaining talent. Retention rates are higher for employees that join companies through the VET program.

7. Students are succeeding in the program. Over 95 percent of young people in Switzerland earn a high school diploma. Students that participate in the apprenticeship program earn a starting average wage of $600-700 per month, rising to about $1,100-1,200 per month in their third year.

*While there are some elements of the Swiss system that will be nearly impossible to replicate – such as free higher education – there is much our state can learn from Switzerland to improve our career- connected learning system.*

### Colorado: How One State Is Adopting the SWISS VET Model (see appendix for full paper on Colorado's program)

Like Washington, Colorado is facing a skills gap and an education & workforce training system that isn't keeping pace with economic and workforce needs. A group of Colorado's business, education and policy leaders came together to study the Switzerland apprenticeship model as a potential solution and then proposed a strategy for building a similar model in their state. By September 2016, Gov. John Hickenlooper, the State of Colorado, Bloomberg Philanthropies, JPMorgan Chase & Co., the Markle Foundation and others committed $11 million to build a new statewide apprenticeship and career exploration system for high school

students. CareerWise[4] was formed as a non-profit organization to develop and implement a strategy and to serve as the intermediary between businesses, educators, and students.  The organization will be responsible for recruiting employers to participate; helping employers to build the human resources functions necessary; developing sector-specific learning curricula, required competencies and training centers; training and developing the employees who will serve as on-the-job mentors; and interfacing with the schools, colleges and universities to build interconnected pathways. In the Fall of 2017, the program will start with 250 apprenticeships in three sectors.  By 2026, the goal is to grow to over 20,000 apprenticeships in 500 high demand fields – which is 10% of Colorado's high school juniors and seniors.

The program is being designed but key elements include:

1.  9th and 10th graders will complete a career exploration curriculum.
2.  11th and 12th graders then may choose to pursue a paid, part-time apprenticeship that consist of 2-3 days of paid on the job training and 2-3 days of classroom learning each week.
3.  Students may complete a post-high school training year to receive a certified journeyman status, while obtaining higher education credits
4.  After program completion, students may continue to work in industry, pursue additional technical training, or continue on to a 4-year degree program


*There is much our state can gain by visiting Colorado and learning about their program's strategy and plans.*


### Progress in Washington:  Youth Apprenticeships through AJAC (Aerospace Joint Apprenticeship Committee)[5]

AJAC is a statewide, nonprofit organization, created by the State of Washington in 2008, to address challenges within the aerospace workforce such as increases in worker retirements, the rapid innovation of technology, and a growing production demand.  AJAC's mission is build the next generation of highly skilled and trained aerospace and advanced manufacturing workers by providing exceptional and responsive apprenticeships, innovative training programs with cutting-edge curriculum and highly effective trades trainers.  Most of their programs are geared towards people over eighteen and with a high school diploma or GED. In recent years, they have ventured into youth and pre apprenticeship pilot programs.

One such program is the Production Technician Youth Apprenticeship for high school juniors and seniors in Tacoma.  It combines 2,000 hours paid on-the-job training at an AJAC employer and 150 hours of college-level classroom instruction.  It leads to high school diploma, journey-level card and short-term college certificate for the aerospace and advanced manufacturing industries. Here's how the program works:

- Available to high school juniors and seniors in Tacoma Public Schools, minimum 2.0 GPA and completed, passed Algebra 1.
- Apprentices will work 10-20 hours per week during the school year and full-time during the summer. Pay varies by employer and number of hours worked.
- Each apprentice is paired with a mentor from the employing company and is evaluated on a quarterly basis.
- Apprentices attend class one night a week at Lincoln High School to learn advanced manufacturing theory.  Additionally, the apprentices will earn 15 total college credits, tuition-free from Bates Technical College.
- AJAC covers the costs to run the program and school credits while the employer covers the wages.

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[4] http://www.careerwisecolorado.org/
[5] http://www.ajactraining.org/

This program is very small in size and scope now with one high school and 15 apprentices, but it has the funding to scale into 4 more high schools and 60 more apprentices starting in the Fall 2017. This diagram illustrates the student pathway through the program:
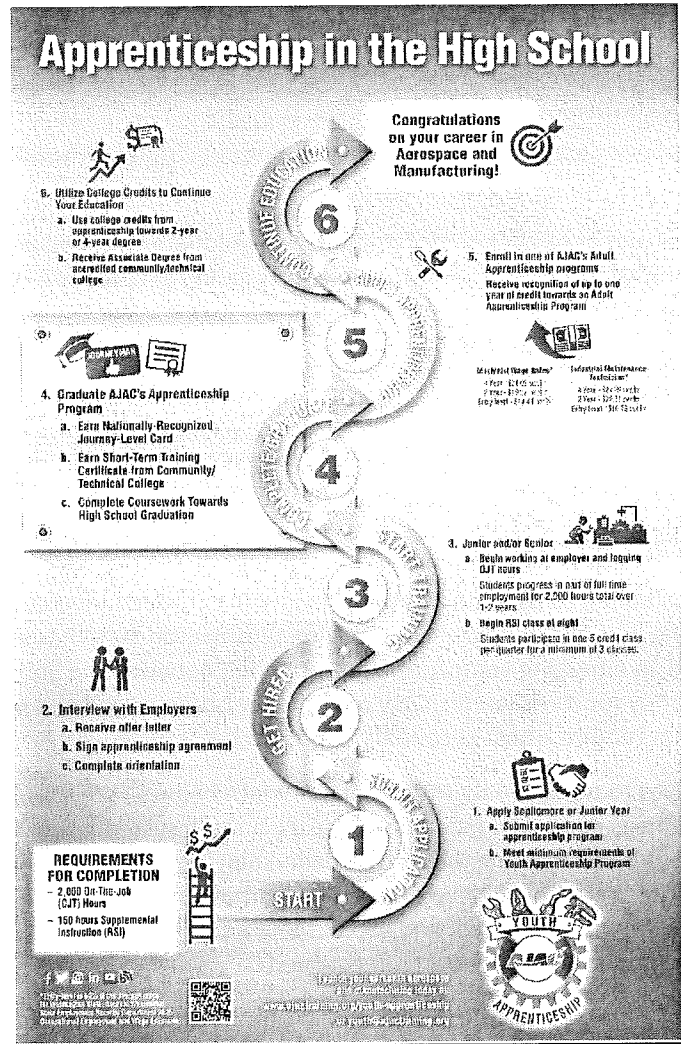


*AJAC is a leader in the state delivering aerospace apprenticeship programs. The IT sector can explore opportunities to create a similar industry-supported structure and program design. Perhaps there is an opportunity to develop one of the four new programs around an IT oriented youth apprenticeship.*

## Systematizing Washington's career exploration, mentorship, and apprenticeship opportunities for WA State students

While Washington is a leader in job creation, most of our young people are not currently on a path that will prepare them to compete for the great jobs being created across our state. Many students in Washington State either aren't aware, encouraged or interested in pursuing the needed post-secondary credentials, due to a lack of exposure, opportunity, and support. Employers, youth agencies and school districts are tackling the challenge but often in uncoordinated ways, leading to limited reach and unsustainable impacts. The challenges are particularly acute when it comes to STEM and healthcare, which fuels many of the fastest-growing and best-paying jobs in the state.

In collaboration with the Governor's office, Washington STEM has prepared recommendations for ensuring that every Washington student graduates from high school with a career goal and prepared for success by providing education and training pathways that are informed and supported by frequent, high-quality career-connected learning experiences. Milestones in such a system would include:

Elementary School students:  By fifth grade, students will have engaged in three industry-based design challenges that support career awareness and learning consistent with standards in relevant content areas.

Middle School Students: By eighth grade, students will have engaged in one industry-based mentorship or job shadow experience that supports career exploration and learning consistent with standards in relevant content areas.

High School Students:  At the end of twelfth grade, students will graduate with one industry-based internship or pre-apprenticeships/apprenticeship experience that supports career preparation consistent with standards in relevant content areas.

Out of School Youth: Every re-engaged youth will have one 90-hour industry-based internship or job experience that supports a desired career pathway or pre-apprenticeship/apprenticeship.

*With leadership from the private and public sector over the next year, Washington state can take steps to develop a long-term plan that better connects Washington's young people with the jobs of tomorrow.*

**Opportunities for Washington State:**

Washington state is well-positioned to become a national leader in career-connected learning that prepares its young people for the great jobs of tomorrow.  Recognizing Washington State has an extensive registered apprenticeship network and an emerging youth/pre-apprenticeship network, the State isn't immune to the challenges creating opportunity for all its youth.  Only one in three students today is on their way to a middle- or high-wage job that require a post-secondary degree or credential.

We should challenge ourselves to not leave two-thirds of our youth behind.  We should build on the momentum and the many efforts currently underway by taking a more systemic and scalable approach to these programs.  This will require formalizing the state's leadership; building a coalition among educators, employers and organized labor; investing in deep, immersive learning of best practices from around the state, across the country and around the world; and establishing a set of governance, policy and financial requirements.  There are steps we can begin now to get started:

**Build and fund a strong public-private partnership to define targets and study the most effective youth apprenticeship systems across the globe.  By September 2017, the partnership will propose recommendations for building a high impact and sustainable career-connected learning system that prepares students from across Washington State for middle- and high-wage jobs.**

1. **Establish a youth apprenticeship core planning team** that will participate in organized learning tours to Colorado's CareerWise, New York's P-Tech and the Swiss VET Summit (all completed by July 2017). The group will include leaders from business, education, philanthropy, labor unions, government and subject matter experts. (Lead TBD)
2. **Support Governor Inslee's initiative for Career-Connected Learning**, including a possible 2017 Legislative funding proposal to engage in-and-out-of-school youth in career-connected learning opportunities, including youth pre/apprenticeships, across the K12 and youth development sectors.  Efforts will initially focus on low income, rural youth and youth from populations underrepresented in high-demand fields such as IT, healthcare, aerospace, manufacturing, construction and maritime.  Specific and measurable targets will be defined and tracked, such as increasing the number of youth apprenticeship completers, internships and job shadows. State and private matching funds will be invested to seed or scale up high-impact models that support

youth to explore and prepare for high-demand jobs. The robust industry-education partnerships and enabling policies that must be created to support effective implementation will drive systemic change, with the goal of creating more transparent, aligned and permeable pathways to great jobs for Washington students. (Washington STEM lead)

3. **Learn from current youth apprenticeship programs *in state*** and understand applicability to IT and other sector programs: In the last two years, the US Department of Labor has awarded Washington state's King County five grants to pilot/grow apprenticeship programs (see above). Two of these programs are focused on IT, but targeted at people over the age of 18, often with significant job experience and/or college degrees. The other three programs are focused on manufacturing but are targeting youth in high school and community college. As these programs are being built, programed and assessed, we can learn important lessons that can help us develop better plans for future pre/apprenticeships in other sectors. (MSFT, WTIA leads)

**Here's who is interested in working in partnership with us in this effort:**

| | |
|---|---|
| Employers | Boeing, JPMorgan Chase, Swedish-Providence |
| Associations | WTIA, TechAlliance |
| Nonprofits | WA STEM, WSOS, AJAC |
| Existing Collaborations | Seattle Regional Partnership – Middle Wage Jobs (Chamber, Seattle Foundation) Challenge Seattle Reconnecting Youth (UWKC, Starbucks, Seattle Foundation) |
| Governments | Governor Inslee's Office, King County, City of Seattle |
| Advocacy | League of Education Voters |

## Conclusion

Washington has the opportunity to provide thousands of young people access to middle- and high-wage jobs and career mobility. But, it needs a systemic approach for developing, promoting and implementing education and training pathways that meet labor market demands and meet student needs. Many organizations such as the Washington Roundtable, Challenge Seattle, the Seattle Regional Partnership, Washington STEM are eager to work with individual businesses and government leaders to advance the effort. To get started we need leadership in the state to explore apprenticeship models to provide greater choice and opportunity for students in fulfilling their future career goals, while at the same time addressing the critical skills gap in business and industry. In 2017, we can get started by learning from successful systems such as Switzerland's VET program and emerging programs like Colorado's CareerWise, by advocating for funding in the upcoming legislative session and by building the public-private partnership. This memo serves as a starting point.

## Appendix and Key Readings

1. A great overview of the Swiss VET system is called "Gold Standard: The Swiss Vocational Education and Training System", March 2015; Center on International Benchmarking
2. A recent analysis of Colorado's readiness and progress for a youth apprenticeship program by the VET team: "From Bright Spots to a System: Measuring education-employment linkage in Colorado career and technical education", November 2016, KOF Swiss Economic Institute, ETH Zurich (PAPER IS COMING BY 11/18)