HIGHER EDUCATION COORDINATING COMMISSION

ADVANCING STEM EDUCATION IN OREGON:
STEM Investment Council, Regional STEM Hubs, and STEM Innovation Grants

February 2019

LBCC

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EXECUTIVE SUMMARY

This report provides an update to the Legislative Assembly on the key components of Oregon's STEM Ecosystem – the STEM Investment Council, STEM Education Plan, Regional STEM Hub Network, and STEM Innovation Grants – as well as a status check on the state of student STEM outcomes in Oregon.

STEM INVESTMENT COUNCIL

Building on years of industry-public sector partnership in shaping STEM education policy in Oregon, in 2013, the Legislative Assembly and Governor Kitzhaber established the industry-driven STEM Investment Council. The Council's primary functions are to develop and oversee the implementation of a long-term STEM Education Plan for Oregon and advise the State Board of Education and Higher Education Coordinating Commission on state investments in STEM education. The STEM Education Plan and associated investments are intended to meet the following target outcomes:

1) Double the percentage of Oregon's students in 4th and 8th grades who are proficient or advanced in mathematics and science by 2025
2) Double the number of Oregon's students who earn a postsecondary STEM degree or credential by 2025

STEM EDUCATION PLAN

The STEM Education Plan, completed by the STEM Investment Council in late 2016, sets forth the principles and strategies that will transform how we educate our learners from preschool through higher education. The Plan lays out four main goals:

1) Inspire and empower our students to develop the knowledge, skills, and mindsets necessary to thrive in a rapidly changing, technology rich, global society.
2) Ensure equitable opportunities and access for every student to become a part of an inclusive innovation economy.
3) Continuously improve the effectiveness, support, and the number of formal and informal P-20 STEM educators.
4) Create sustainable and supportive conditions to achieve STEM outcomes aligned to Oregon's economic, education, and community goals.

Each goal has a set of associated key initiatives, which, when implemented, will lead to achievement of that goal, and measurable priority outcomes that indicate progress toward that goal.

The Council believes that, in pursing these goals, Oregon will create a learning environment that engages students meaningfully in their studies, prepares Oregonians for high wage, high demand jobs, and empowers our communities to build Oregon's inclusive, sustainable, and innovation-based economy of the future.

THE STATE OF STEM IN OREGON

The STEM Education Plan identifies a number of metrics for use in tracking progress on Oregon's ambitious STEM education goals. As is to be expected, only two years into implementation of the plan, absent the investment needed to effect full-scale system change, and with limited capacity and capability for data collection and analysis, the data show little statewide improvement.

However, the Council is thrilled by the pockets of excellence and innovation fostered by the Regional STEM Hubs and their partners, and remains confident that, given time and with meaningful state support and investment, we can realize the Council's vision for STEM education in Oregon.

REGIONAL STEM HUB NETWORK

Funded in part by the state, the Regional STEM Hub Network, comprising 13 individual STEM/STEAM Hubs and reaching nearly the entire state, is Oregon's primary instrument for effecting change in STEM education. These hubs are multi-sector partnerships that link local P-20 educators with representatives from workforce and economic development, community-based organizations, and business to devise local solutions to local needs. They coordinate regional communication and partnerships, improve key student outcomes, build capacity and sustainability for change, and encourage and support local and statewide engagement.

Collectively, the Regional STEM Hub Network has produced the following estimated results:

- **4,129 educators** participated in **43,383 hours** of Hub-supported professional development, impacting **223,559 students** (**38.5% of students** in the state)
- **2,892 industry volunteers** donated **13,186 hours** to participate in Hub directed programs
- **37,818 students** participated in **181,272 hours** of Hub directed STEM programs
- **49,228 students** and **897 teachers** benefited from Hub supported STEM equipment loaning programs
- **Secured $7,793,966.54** in grants and sponsorships, partner investments in Hub initiatives, in-kind time and resources for the current and future biennia

STEM INNOVATION GRANTS

Funded by the state, STEM Innovation Grants are designed to expand the implementation of effective STEM programs and to test innovative approaches to STEM teaching and learning. In particular, these grants have focused on transforming instruction within STEM disciplines through educator professional development. Current funded projects include:

1) Math in Real Life
2) Digital Literacy and Computer Science Innovation
3) STEM Beyond School

CONCLUSION

Oregon has taken crucial steps toward creating a strong and vibrant STEM Ecosystem. The establishment of the STEM Investment Council – codifying the essential advisory role of industry in STEM policy development – gave this cross-sector work a home. The STEM Education Plan provides the blueprint for reimagining and transforming how we spur interest in, increase attainment of, and broaden opportunities for our learners. The Regional STEM Hub Network – up and running throughout nearly the entire state – is truly moving the needle as the Hubs implement the STEM Education Plan in their communities. Through their partnerships with business, education, community organizations, and elected officials, the STEM Hubs are creating real and lasting change. The STEM Innovation Grants have created content, material, and approaches that introduce new ways of teaching kids in STEM and lead to better STEM outcomes throughout the state.

While the high-level data may not yet reflect systemic change, we must recognize the importance of the regional success stories blossoming around the state. Oregon is still in the early stages of this work and now we have the infrastructure and momentum needed to scale it up. We must continue these efforts if we are to improve student outcomes and create pathways to high-wage, high-demand jobs, while preparing our students to be life-long learners.

STEM INVESTMENT COUNCIL

HISTORY

For more than 20 years, Oregon's leaders have relied on industry-driven, legislatively-established councils and task forces to shape the state's vision for and investments in science, technology, engineering, and mathematics (STEM) education. What follows is a summary of the key pieces of legislation – and the entities and initiatives they created – that led to the establishment of the STEM Investment Council.

Senate Bill 504 (1997) – Oregon Engineering Education Investment Fund and Engineering and Technology Industry Council
HB 504 created the Oregon Engineering Education Investment Fund and directed the Oregon University System to establish the Engineering and Technology Industry Council (ETIC). By law, ETIC's membership was to be majority representatives of high-technology companies in Oregon, and its mandate was to establish criteria for the disbursement engineering investments from the Oregon Engineering Education Investment Fund.[1]

With the disbandment of the Oregon University System in 2015, ETIC was sunsetted, though the Legislative Assembly has continued to fund public university engineering and technology programs ($24.5 million in 2015-17 and $25.6 in 2017-19).

House Bill 4056 (2012) – Joint Interim Task Force on STEM Access and Success/STEM Fund
In 2012, the passage of HB 4056 (House Interim Committee on Higher Education) created the Joint Interim Task Force on STEM Access and Success, and established the STEM Fund in the State Treasury.

The Task Force, whose main focus was to encourage students to study science, technology, engineering, and math, comprised 17 members from the Legislative Assembly, industry, education, STEM organizations, and student groups, including Rep. Chris Harker (Chair), Sen. Fred Girod, Sen. Elizabeth Steiner Hayward, and Rep. Shawn Lindsey. The Task Force was directed to assess the STEM education landscape in the state and make recommendations regarding the future of STEM in Oregon.[2] The Task Force submitted a report to the Legislature with four legislative recommendations, including:

1) The establishment of a STEM Council within the Chief Education Office, tasked with:
    a. Adopting and advancing an ambitious STEM education agenda;
    b. Developing and managing the infrastructure for STEM Hubs;
    c. Administering money appropriated from the general fund for STEM development;
    d. Ensuring appropriate resource distribution and accountability for STEM Hubs and other STEM programs.

2) Establishment of regional STEM Hubs – centers to channel and coordinate community, regional, and state STEM resources for P-20 students, teachers, and industry professionals.

3) Increased investment in IT infrastructure, tuition support for STEM degree pursuers, and base funding to ensure success for students in the STEM pipeline.

4) Incentivizing industry partnerships in STEM Education.

[1] http://library.state.or.us/repository/2010/201010061538333/1997.pdf
[2] https://olis.leg.state.or.us/liz/2012R1/Downloads/MeasureDocument/HB4056/Enrolled

Per HB 4056, the Interim Task Force was sunsetted at the start of the 2013 Legislative Session.

House Bill 2636 (2013) – STEM Investment Council
Heeding the advice of the Joint Interim Task Force on STEM Access and Success, in 2013, through the passage and signing into law of HB 2636 (Rep. Harker, Sen. Knopp, Sen. Steiner Hayward), Oregon's Legislative Assembly and Governor Kitzhaber established the STEM Investment Council.

Originally operating under the direction of the Chief Education Office and supported by the staff of the Chief Education Office, on July 1, 2018, the Higher Education Coordinating Commission (HECC) assumed the role of supporting the Council. With the sunset of the Chief Education Office on July 1, 2019, the Council will begin to operate under the joint direction of the State Board of Education (State Board) and HECC.

PURPOSE

The STEM Investment Council's primary function is to assist the State Board and HECC in developing and overseeing a long-term strategy to advance Oregon's target outcomes around STEM education, specifically:

1. Double the percentage of Oregon's students in 4th and 8th grades who are proficient or advanced in mathematics and science by 2025.

2. Double the number of Oregon's students who earn a postsecondary STEM degree/credential by 2025.

In addition to the development and oversight of a long-term, statewide STEM Education Plan, the Council makes recommendations to the State Board regarding the administration of the STEM Investment Grant Program (ORS 327.380) and grants to Regional STEM Hubs (ORS 327.372), and to the State Board and HECC regarding other investments in STEM education made or overseen by the Chief Education Office.

The Council submits an annual report to the State Board, HECC, and Legislative Assembly on progress made toward achieving the statewide STEM goals set forth in state statute and the STEM Education plan, and on the activities conducted under the STEM Investment Grant Program.[3]

MEMBERSHIP

The Council consists of nine voting members from the private sector, jointly appointed by the Superintendent of Public Instruction and the Executive Director of the Higher Education Coordinating Commission. Current members include:

Jim Piro (Chair)
President & CEO, Portland General Electric (retired)

Celeste Edman
CEO, Lunar Logic

Herb Fricke
President, Akana

Rita Hansen
CEO & Co-Founder, Onboard Dynamics

Eric Meslow
President, Timbercon

Paul Stewart
Chief Strategy Officer, Innovate Oregon

(Ex Officio) Melissa Dubois
Executive Director, South Metro-Salem STEM Hub

(Ex Officio) Todd Nell
Director, Oregon Workforce and Talent Development Board

[3] https://olis.leg.state.or.us/liz/2013R1/Downloads/MeasureDocument/HB2636/Enrolled

In addition to its voting members, the Council is to recruit K-12 and postsecondary educators and administrators to serve as non-voting advisory members. The Council intends to make such recruitment a priority in 2019.

The Council may also recruit additional non-voting advisory members and establish advisory and technical committees. The Council used this authority to establish the following advisory and technical committees:

- Subcommittee on Equity
- Subcommittee on Data and Metrics
- Subcommittee on Advocacy and Communications

STEM EDUCATION PLAN

WHY STEM?

When implemented effectively across the education continuum, STEM education has the power to engage students meaningfully in their studies, prepare Oregonians for high wage, high demand jobs, and empower our communities to build Oregon's inclusive, sustainable, and innovation-based economy of the future.

In 2017, Oregon saw the fifth fastest job growth in the nation, adding 50,600 jobs.[4] A significant amount of that growth – and future projected job growth – is driven by demand in STEM fields. In fact, the Oregon Employment Department projects more than 430,000 job openings in STEM fields in Oregon between 2017 and 2027 – a growth rate of 15 percent, or 3 percent higher than the projected growth rate for all jobs in Oregon during the same 10-year period. Moreover, roughly 93 percent of the projected job openings in STEM fields are in high wage occupations and about 90 percent are in high demand occupations.[5] To fill these jobs and continue growth, Oregon's employers need – now and in the future – a STEM-literate workforce.

Yet, the importance of STEM education reaches far beyond employer demand. STEM education based on career-connected, applied learning approaches, gets students excited about studies, empowers students to think about the possibilities for their futures, and increases student outcomes. Through its multidisciplinary, cross-sector methodology, STEM education provides students with the set of skills – critical thinking, problem solving, adaptability, etc. – to succeed in the future.

STEM? STEAM? What does it all mean?

As required by statute, the STEM Education Plan uses "STEM." However, the Council believes that, for the purposes of the Plan, "STEM" can be viewed as synonymous with the other terms, such as STEAM, STREAM, STEMM, METS, i-STEM, e-STEM, TEAMS, S2 TEM, MESHT, etc. Oregonians generally agree on the fundamental principles and values put forward in the STEM Manifesto. These ideals strive to communicate a vision of STEM education through which we ignite an inclusive renaissance of curiosity, creativity, wonderment, innovation, and the joyful pursuit of life-long learning and talent discovery. In this light, STEM can be viewed as "applied curiosity"—the insatiable desire to know and wonder, coupled with a creative drive to make, invent, and contribute to the betterment of humanity.

[4] Oregon Employment Department, https://www.qualityinfo.org/-/oregon-s-job-growth-fifth-fastest-among-the-states

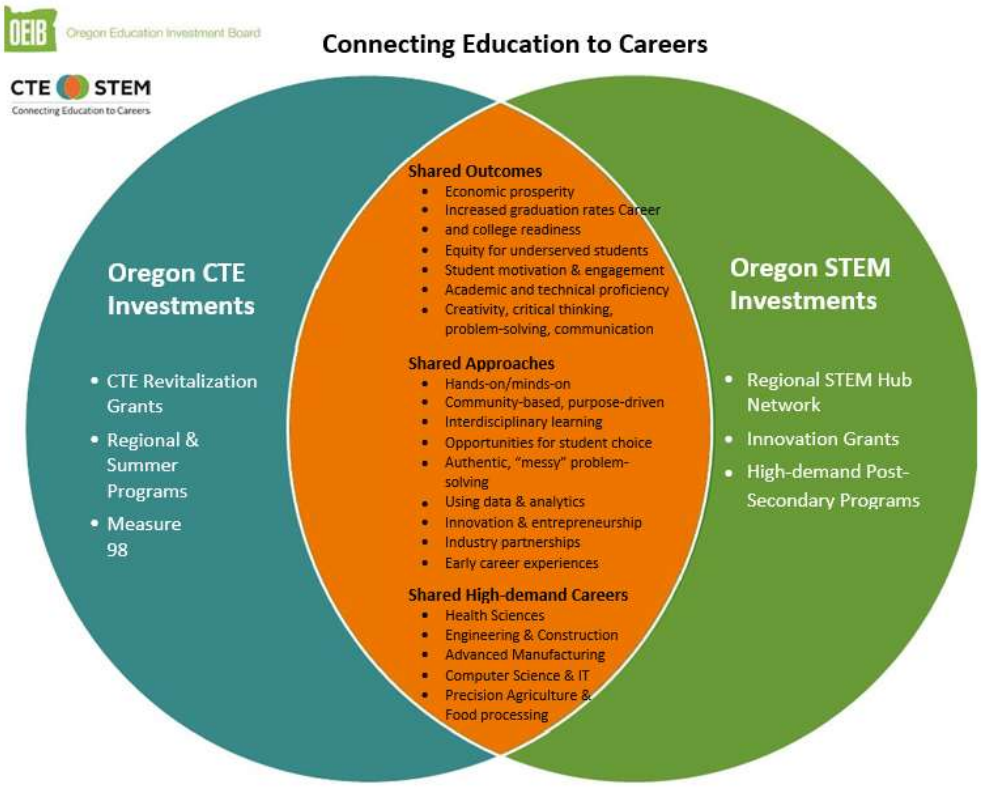
[5] Oregon Employment Department, https://www.qualityinfo.org/-/10-year-occupational-projections-for-stem-jobs

STEM AND CTE

STEM and CTE are highly complementary and frequently overlap. Both types of programs engage and motivate students through real world, applied learning, and foster creativity, critical thinking, problem solving, communication, and teamwork. When STEM and CTE leaders and educators work together, they can leverage funding, broaden students' exposure to a variety of academic and career opportunities, and ensure our future workforce possesses the mix of skills and knowledge necessary to catalyze economic development.

Many CTE programs are in STEM fields, and, by including instruction on STEM concepts, provide students with the knowledge, theories, and assumptions underpinning the career and technical skills they are learning. These CTE programs can offer an entry point into STEM fields, particularly for students from underrepresented populations. Similarly, STEM education incorporates elements of CTE, illuminating for students the connection between abstract concepts and future careers, and provides students with the foundational knowledge and skills they need to be interested and succeed in CTE electives.

A prime example of how STEM and CTE can and should work together is Measure 98, which established the High School Success fund with up to $170 million in the 2017-19 biennium. The measure provides funding for dropout prevention, career & technical education, and college level education opportunities. The Department of Education, in dispersing these funds, has made an effort to ensure that funded CTE programming contains a STEM component. However, the Measure 98 funding focuses on high school only. Similar investments must be made in middle school – and even earlier – to create an active pipeline into high school programs.



[6]

[6] STEM Education Plan, http://education.oregon.gov/wp-content/uploads/2016/11/STEM-Education-Plan-Final_CEdO_Nov_2016.pdf

PLAN DEVELOPMENT

In December 2016, after more than 18 months of research, deliberation, and engagement, the STEM Investment Council recommended a comprehensive set of strategies to transform the delivery of science, technology, engineering, and mathematics in Oregon through the establishment of the STEM Education Plan. To develop the plan, the Council consulted educators, business, community-based organizations, and other stakeholders.

GOALS

The STEM Education Plan's vision is to "[r]eimagine and transform how we educate learners in order to enhance their life prospects, empower their communities, and build an inclusive sustainable, innovation-based economy. Oregonians of all races, economic status, and regions will develop the fundamental STEM-enabled skills and mindsets necessary to:

- Improve the prosperity of all individuals and communities across the state
- Become creative life-long learners who can adapt to changing social and economic conditions
- Fully contribute to an increasingly complex and technologically rich global society
- Address high-demand, competitive workforce and industry needs"[7]

In addition to the target outcomes related to STEM set forth in state statute, the STEM Education Plan identifies four central goals designed to spur interest, attainment, and opportunities for learners through STEM education:

1) Inspire and empower our students to develop the knowledge, skills, and mindsets necessary to thrive in a rapidly changing, technology rich, global society.
2) Ensure equitable opportunities and access for every student to become a part of an inclusive innovation economy.
3) Continuously improve the effectiveness, support, and the number of formal and informal P-20 STEM educators.
4) Create sustainable and supportive conditions to achieve STEM outcomes aligned to Oregon's economic, education, and community goals.

Each of these goals has a set of associated key initiatives, which, if implemented, will lead to achievement of that goal, and measurable priority outcomes that indicate progress toward that goal.

NEXT STEPS

In November 2018, the STEM Investment Council began the process of reviewing the STEM Education Plan, asking of itself the following questions:

- Are the goals still the right goals?
- Are the priority outcomes still the right priority outcomes?
- Are the key initiatives still the right key initiatives?
- Have we identified the correct metrics to monitor progress?
- Do we have the ability to collect the identified metrics?
- What progress has been made toward each goal?

Upon completion of the review, if necessary changes are identified, the Council will make recommendations to the State Board and HECC on revisions to the plan.

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[7] http://education.oregon.gov/wp-content/uploads/2016/11/STEM-Education-Plan-Final_CEdO_Nov_2016.pdf

THE STATE OF STEM IN OREGON

State statute and the STEM Education Plan identify a number of target outcomes related to STEM education. So, where are we today? The data below show that Oregon has made little statewide progress on key STEM education metrics. To be clear, Oregon's target outcomes are highly ambitious. For context, in 2017, Massachusetts had the highest math proficiency on the National Assessment of Educational Progress (NAEP) in the country at 53 percent. Doubling Oregon's 2014-15 rate on our Smarter Balanced statewide math assessment would mean 86 percent of 4th graders would be proficient in math. It will take years of focused effort and targeted resource allocation to see progress reflected in the data. Furthermore, it will take time for students entering the education pipeline – with its new focus on STEM and updated science and math standards – to move through the system and be included in key data points.

The Council also does not expect to see improvement absent a meaningful commitment from the state. While the Department of Education revised math and science standards to align with Common Core and Next Generation Science Standards, and the Regional STEM Hub Network has been remarkable in its ability to leverage modest state support to foster pockets of excellence and school improvements within its partner school districts, a relatively small proportion of schools statewide have made changes to the way they teach.

Not all metrics identified in the STEM Education Plan are addressed in this section due to limited staff capacity and difficulty in collecting data. However, the STEM Investment Council continues its commitment to identifying sources for and organizing collection of these data. The Council hopes that, once fully operational, the State Longitudinal Data System[8] will be a critical resource for measuring progress on STEM education, particularly in assessing how regional interventions and paradigm shifts have impacted student outcomes.

Appendix B includes additional analyses of the data disaggregated by race/ethnicity, gender, socioeconomic status, and region for each outcome for which data was available.

➔ **OUTCOME: Double the percentage of 4th and 8th grade students proficient in math by 2025**

Charts 1 and 2 compare the percentage of students deemed proficient (achieving level 3 or 4) on the 4th and 8th grade statewide mathematics assessments in 2014-15, 2015-16, 2016-17, and 2017-18.[9]

Chart 1

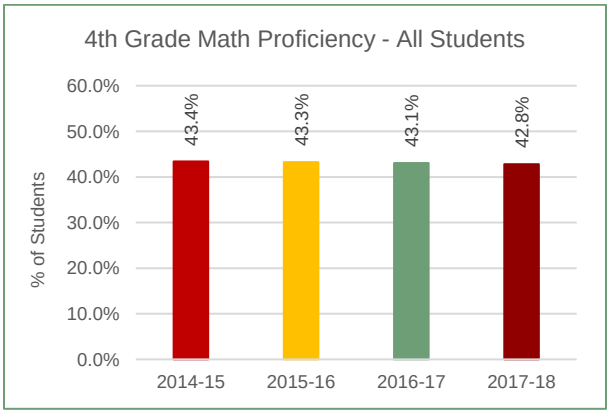
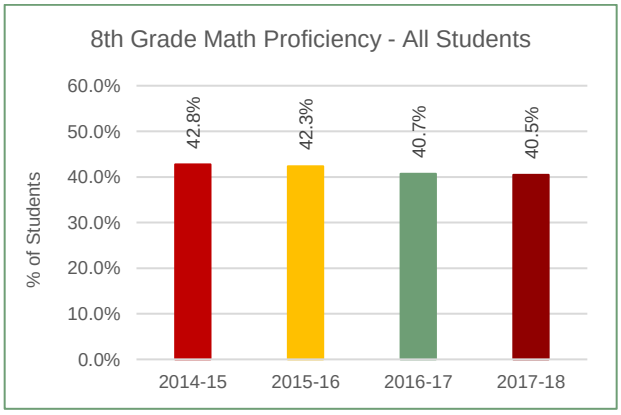


Chart 2



[8] http://education.oregon.gov/slds/
[9] Oregon Department of Education, https://www.oregon.gov/ode/educator-resources/assessment/Pages/Assessment-Group-Reports.aspx

➔ **OUTCOME: Double the percentage of 4th and 8th grade students proficient in science by 2025**

Charts 3 and 4 compare the percentage of students deemed proficient (achieving level 3 or 4) on the 4th and 8th grade statewide science assessments in 2014-15, 2015-16, 2016017, and 2017-18.[10]

Chart 3

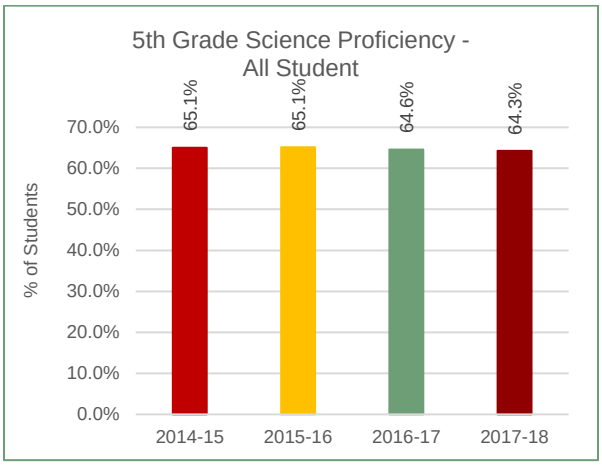
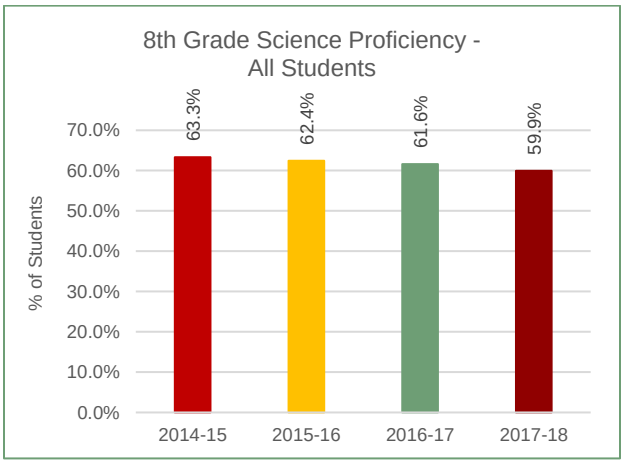


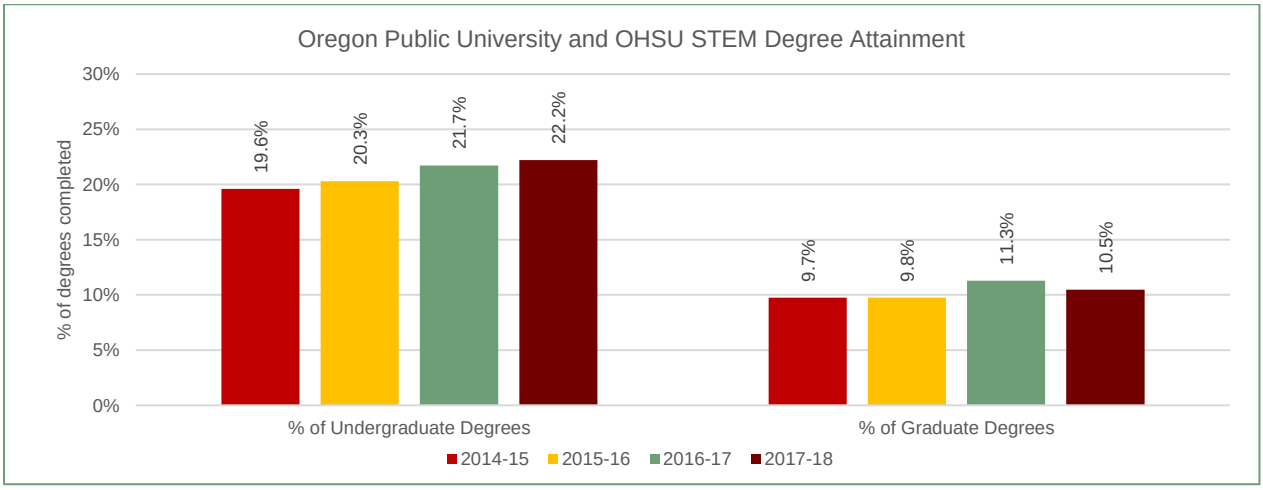
Chart 4



➔ **OUTCOME: Double the number of Oregon's students with postsecondary STEM degrees and certificates by 2025 & increase number of students enrolled in STEM programs**

Chart 5 shows the percentage of undergraduate and graduate degree completions at Oregon's public universities and OHSU in STEM disciplines for the 2014-15, 2015-16, 2016-17, and 2017-18 school years.[11]

Chart 5

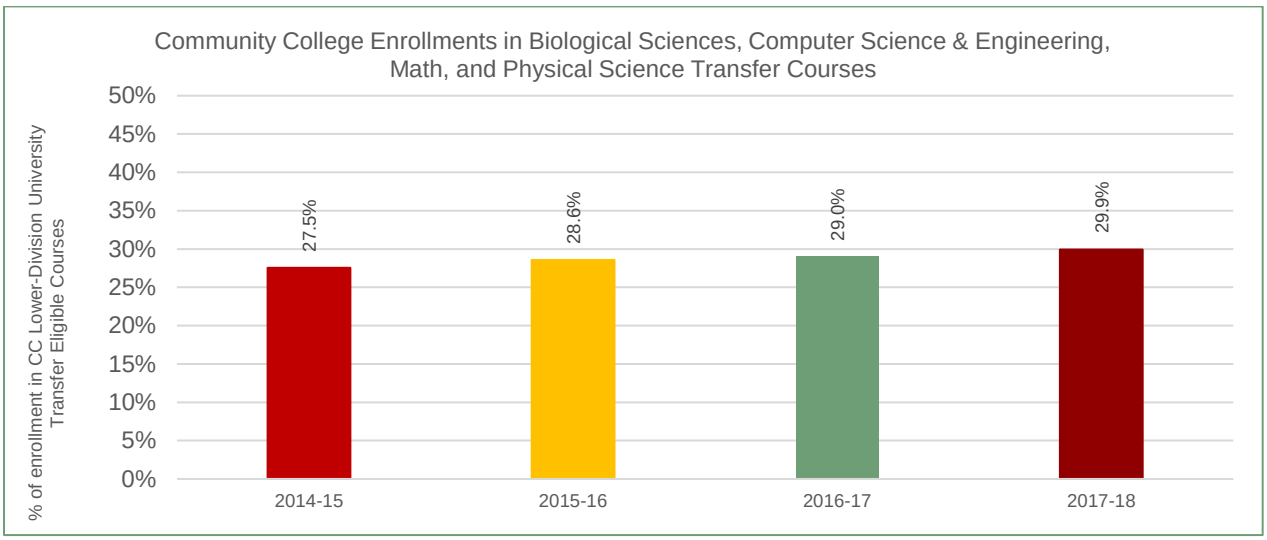


[10] Oregon Department of Education, https://www.oregon.gov/ode/educator-resources/assessment/Pages/Assessment-Group-Reports.aspx

[11] Data for Oregon public universities (excluding OHSU 2016-17 data) collected from universities by HECC through the Student Centralized Administrative Reporting File (SCARF). OHSU 2016-17 data taken from IPEDS. Data for 2017-18 does not include OHSU. Contact the HECC for more information regarding data.

Chart 6 shows the percentage of community college lower division university transfer eligible course enrollments in Biological Sciences, Computer Science & Engineering, Math, and Physical Science fields.[12]

Chart 6



➔ **OUTCOME: Increase success on AP, ACT, and SAT STEM Tests**

Charts 7 and 8 show the percentage of SAT test takers from the 2017[13] and 2018[14] graduating classes that met the math benchmark score (benchmark data for earlier years were not available).[15]

Chart 7

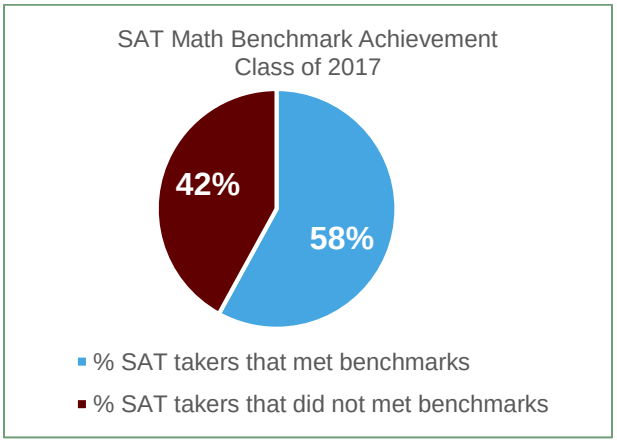
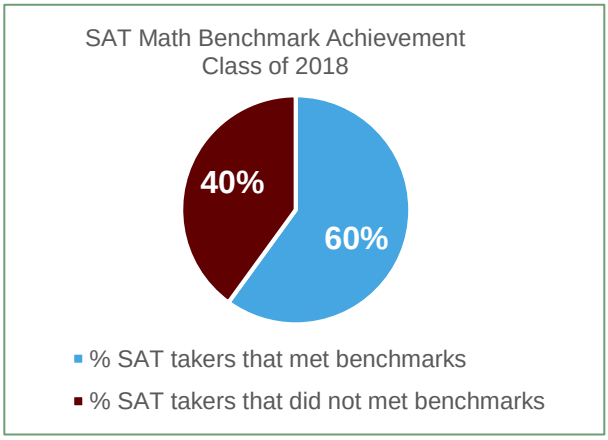


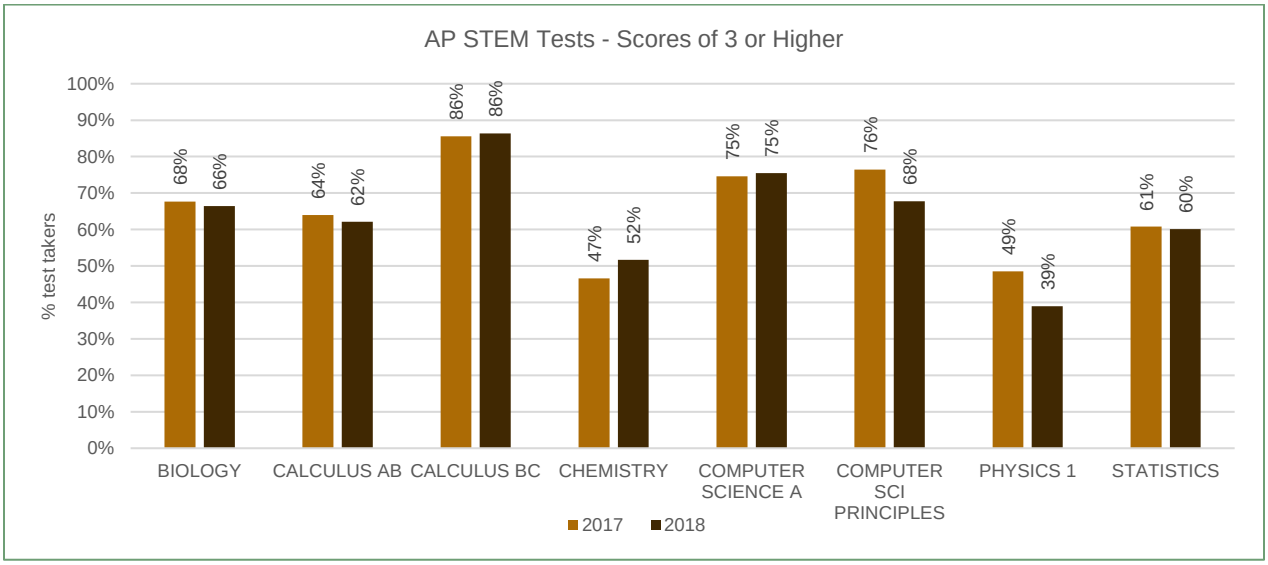
Chart 8



[12] Data collected by the HECC from community collegse through the D4A data system. Contact the HECC for additional information regarding data.
[13] College Board, https://reports.collegeboard.org/pdf/2017-oregon-sat-suite-assessments-annual-report.pdf
[14] College Board, https://reports.collegeboard.org/pdf/2018-oregon-sat-suite-assessments-annual-report.pdf
[15] Students with an SAT Math score that meets or exceeds the benchmark have a 75 percent chance of earning at least a C in first-semester, credit-bearing college courses in algebra, statistics, pre-calculus, or calculus (https://collegereadiness.collegeboard.org/about/scores/benchmarks).

Chart 9 shows the percentage of students achieving a score of 3 or higher on a selection of AP STEM tests in 2017[16] and 2018[17].

Chart 9



Charts 10 and 11 show the percentage of ACT test takers from the 2011 – 2014 graduating high school classes that met the math and science benchmark scores (data for subsequent years were not available).[18,19]

Chart 10

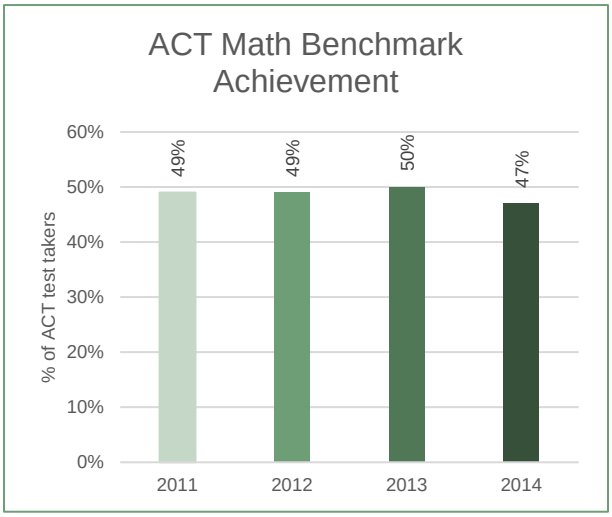
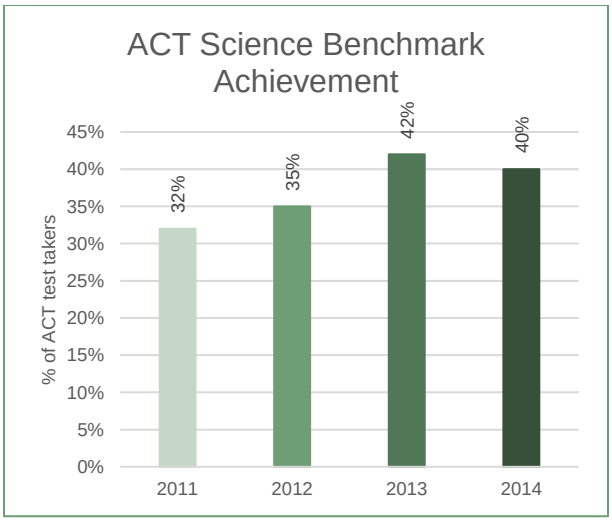


Chart 11



[16] College Board, https://secure-media.collegeboard.org/digitalServices/misc/ap/oregon-summary-2017.xlsx
[17] College Board, https://secure-media.collegeboard.org/digitalServices/misc/ap/oregon-summary-2018.xlsx
[18] http://www.act.org/content/dam/act/unsecured/documents/STEM2016_38_Oregon.pdf
[19] Students with an ACT Math score that meets or exceeds the benchmark have a 75 percent chance of earning at least a C in first-semester, credit-bearing college courses (http://www.act.org/content/act/en/college-and-career-readiness/benchmarks.html)

REGIONAL STEM HUB NETWORK

HISTORY AND PURPOSE

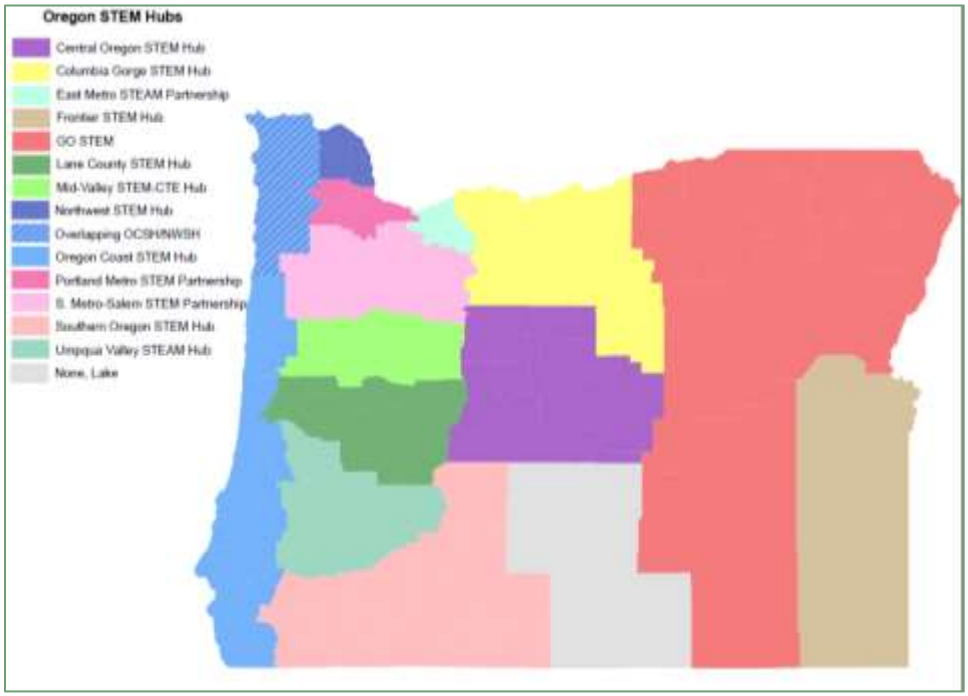
As a key strategy to accelerate improved outcomes across the state, in 2013, the State Legislature codified a statewide network of Regional STEM Hubs. These hubs devise local solutions to local needs. They coordinate regional communication and partnerships, improve key student outcomes, build capacity and sustainability for change, and encourage and support local and statewide engagement.

Hubs are multi-sector partnerships linking local P-20 educators with representatives from workforce, economic development, community-based organizations, and business to transform STEM teaching and learning.

Originally a network of six, there are now 13 Regional STEM Hubs throughout the state.

LEGISLATIVELY ADOPTED BUDGETS			
	2013-15	**2015-17**	**2017-19**
Regional STEM Hub Network	$2.7 million	$5 million	$4.67 million

Funding for Hub operations and programming is disbursed based on size and reach. In the 2017-19 biennium, Tier I Hubs (Portland Metro STEM Partnership, South Metro-Salem STEM Partnership, and Oregon Coast STEM Hub) received $400,000 each, Tier II Hubs (GO-STEM, Lane STEM, Central Oregon STEM Hub, Southern Oregon STEAM Hub, and East Metro STEAM Partnership) received $300,000 each, and Tier III Hubs (Umpqua Valley STEAM Hub, Columbia Gorge STEM Hub, and Frontier STEM Hub) received $250,000. The two new Hubs (Mid-Valley STEM-CTE Hub and Northwest STEM Hub) each received $225,000. Several Hubs were given additional funds for specific projects, and Hubs received varying levels of funding through the STEM Innovation Grant program.



BY THE NUMBERS

The tables below include data collected by the Regional STEM Hubs and demonstrate the collective impact of the Regional STEM Hubs during the 2017-19 Biennium.

STEM Hub Impact Data	Value	Units
Number of educators who participated in Hub professional development	4,129	Educators
Number of educator hours spent in Hub professional development and programs	43,383	Educator Hours
Average number of professional development hours per educator	11	Hours
Projected number of students impacted by educator professional development participation	223,559	Students
Percent of students in Oregon impacted by STEM Hub professional development to their teachers	38.50%	% of students in Oregon
Number of industry volunteers who participated in Hub activities	2,892	Industry Volunteers
Number of industry volunteer hours	13,186	Industry Volunteer Hours
Number of students who participated in Hub directed programs	37,818	Students
Number of student hours in Hub directed programs	181,272	Student Hours
Estimate of students who benefit from equipment loaning programs	49,228	Students
Estimate of teachers who benefit from equipment loaning programs	897	Educators

STEM Hub Leveraged Funding	$
Grants and sponsorships (current biennium)	$2,333,501
Partner investments in Hub initiatives	$1,490,729.81
In-kind time and resources	$967,865.52
Funding and in-kind secured for future biennia	$3,001,870.21
Total	$7,793,966.54

HUB SNAPSHOTS

The following "snapshots" provide a glimpse into the activities and impacts of the Regional STEM Hubs. Appendix A includes additional information about each Hub and its partners, initiatives, and impact.

- **Counties Served:** Crook, Deschutes, Jefferson
- **Representatives:** Rep. Jack Zika (53), Rep. Cheri Helt (54), Rep. Mike McLane (55), Rep. Daniel Bonham (59)
- **Senators:** Sen. Tim Knopp (27), Sen. Dennis Linthicum (28), Sen. Cliff Bentz (30)

FAST FACTS

- Professional development to **583 educators** totaling **4,448 hours**, impacting **33,830 students** (2017-19)
- **1,076 industry volunteers** donated **5,557 hours** to participate in Hub activities (2017-19)
- **10,986 students** spent **27,345 hours** in Hub directed programs (2017-19)

Spotlight Initiative: COMPUTER SCIENCE TASKFORCE

The Computer Science Taskforce, a collective group of industry, K-12 educators, administrators, Tech Directors and post-secondary partners, has collaborated for just over a year to prioritize building a Computer Science (CS) pipeline and integration in our schools to align with growing industry demand in our region. The taskforce has identified CS Champions, defined CS education and integration, vetted curricula, and are providing unique student involved teacher professional development like "Makeathons" and Educator Externships. The momentum of this taskforce has led to some identifiable quick wins, including going from 1 middle school with a CS elective to 12 schools with district-allotted collaboration time, increasing from 1 to potentially 5 new CTE CS Programs of Study, partnering with Lane STEM Hub and ODE for $642K grant for CS pre-apprenticeship work to impact rural schools across the state. With strong teacher champions at the middle school level, we leverage those resources to push demand to the high school.

Contact: Angie Mason Smith, Director, Central Oregon STEM Hub; angie.ms@hdesd.org, 541-693-5797

- **Counties Served:** Gilliam, Hood River, Wasco, Wheeler
- **Representatives:** Rep. Anna Williams (52), Rep. Greg Smith (57), Rep. Daniel Bonham (59)
- **Senators:** Sen. Chuck Thomsen (26), Sen. Bill Hansell (29), Sen. Cliff Bentz (30)

FAST FACTS

- Impacted an estimated **1,200 students** through STEM Nights and Introduce a Girl to Engineering events at **8 locations** (2018)
- **126 educators** participated in **1,646 hours** of STEM professional development (Aug. 2017-Aug. 2018)
- **13 Microgrants/Field Trip Grants** awarded, totaling **$12,191.24**, impacting an **~1,685 students** (2017-18)

Spotlight Initiative: GORGE STEM FAIR

The Gorge STEM Fair is an annual celebration of Science, Technology, Engineering, and Math in the Columbia Gorge. In June 2018 an estimated 2000+ community members, from toddlers to grandparents, engaged in hands-on STEM activities, all inspired by local businesses, nonprofits, and school groups. This annual event helps raise awareness of what STEM is, why it is important, and how to get involved. It is also an example of how STEM Hubs can use collective impact to magnify great work in their communities. The Columbia Gorge STEM Hub expanded an event started by a local robotics team – originally including about 10 groups – to include 50 partner organizations and over 100 STEM Professionals. The Gorge STEM Fair has proven to be not only impactful but also cost effective – all costs were covered by local sponsors.

Contact: Christy Christopher, Director, Columbia Gorge STEM Hub; cchristopher@cgesd.k12.or.us, 541-296-2046

- **Counties Served:** Multnomah
- **Representatives:** Rep. Rick Lewis (18), Rep. Tawna Sanchez (43), Rep. Tina Kotek (44), Rep. Barbara Smith Warner (45), Rep. Alissa Keny-Guyer (46), Rep. Diego Hernandez (47), Rep. Jeff Reardon (48), Rep. Chris Gorsek (49), Rep. Carla Piluso (50), Rep. Janelle Bynum (51) Rep. Anna Williams (52),
- **Senators:** Sen. Betsy Johnson (16), Sen. Lew Frederick (22), Sen. Michael Dembrow (23), Sen. Shemia Fagan (24), Sen. Laurie Monnes Anderson (25), Sen. Chuck Thomsen (26)

FAST FACTS

- **148 educators** received **1,362 professional development hours**, impacting **~28,245 students** (2017-19)
- **625 students** participated in **21,419 hours** of EMSP-supported/funded of STEAM learning (2017-19)
- EMSP has brought over **$1,000,000 in STEM investments** to the East Metro area since 2015

Spotlight Initiative: YOUTH IN STEAM COMMUNICATIONS

The East Metro STEAM Partnership established the Youth in STEAM Communications project as a collaborative among the Center for Advanced Learning (CAL), Lewis Creative, and MetroEast Community Media. The purpose of this project is to build awareness of STEAM for the cross-sector audiences of EMSP. CAL Digital Media and Design students participated in paid internships with Lewis Creative and MetroEast Community Media. As a result, six student interns produced a promo video, STEAM banners, social media messages based on audience profiles (Seniors, Parents, Students, Educators, Non-Profits, and Industry) and content strategy. In 2019, additional student interns will develop a photojournalism project, a brochure, motion graphics, and a passport for STEAM activities. In an October 2018 event held by Lewis Creative for the Gresham Chamber of Commerce, Haley Lewis showcased the content created by the interns, resulting in a post receiving 43 Likes, 27 Comments, 9 Shares, and reached 350 people.

Contact: Landen Zernickow, Director, East Metro STEM Partnership; landen.zernickow@mhcc.edu, 973-978-1868

- **Counties Served:** Malheur
- **Representatives:** Rep. Lynn Findley (60)
- **Senators:** Sen. Cliff Bentz (30)

FAST FACTS

- **824 educators** participated in Hub professional development or other programs
- **5,764 educator hours** spent in Hub professional development or other program
- An estimated **13,354 students** impacted by educator professional development participation

Spotlight Initiative: Exploring STEM Through The Lens of Aviation

Oregon State University Extension, Frontier STEM Hub, Frazier Aviation, University of Idaho Extension, and Treasure Valley Community College Aviation program collaborated with community partners to deliver interactive field days, day camps, and classroom activities for youth. *Exploring STEM Through The Lens of Aviation* program integrates science, technology, engineering, and math into experience and inquiry-based activities that meet Next Generation Science and Common Core Standards. The target population for the aviation activities are disadvantaged and underserved youth grades 6-8. Over the past three years, the aviation programs have reached over 450 youth per year. Student participants reported an increased interest in STEM careers.

Contact: Nickie Shira, STEM/Innovation Coordinator, Frontier STEM Hub; nickie.shira@malesd.k12.or.us, 541-473-4865

- **Counties Served:** Baker, Grant, Harney, Morrow, Umatilla, Union, Wallowa
- **Representatives:** Rep. Greg Smith (57), Rep. Greg Barreto (58), Rep. Lynn Findley (60)
- **Senators:** Sen. Bill Hansell (29), Sen. Cliff Bentz (30)

FAST FACTS

- **1,634 hours** of teacher training provided to **240 educators** (2017-19)
- **3,723 total hours** of student participation provided to **357 students** in out of school programs/events (2017-19)
- **352 total hours** of participation donated from **70 industry professionals** (2017-19)

Spotlight Initiative: CHIEF SCIENCE OFFICER PROGRAM

GO-STEM participates in the nationwide Chief Science Officer (CSO) Program. CSOs are high school students who choose to serve as local STEM leaders. Each CSO completes an independent or team project in their area of passion. In 2018, there were 21 CSOs (roughly the same number of males and females) and 9 advisors across 6 counties. Each CSO disperses information throughout their community and school and attends a 2-day Leadership Institute at EOU, as well as regional trainings and networking events. CSOs also arranged and hosted a "Dinner with a STEM Professional," for 25 students, 18 teachers, 15 VIPs, and 8 STEM professionals. The dinner provided opportunities to learn from and network with different industry professionals from across the region.

Contact: Kim Young, Director, GO-STEM; knyoung1@eou.edu, 541-962-3403

- **Counties Served:** Lane
- **Representatives:** Rep. Cedric Hayden (7), Rep. Paul Holvey (8), Rep. Caddy McKeown (9), Rep. Marty Wilde (11), Rep. John Lively (12), Rep. Nancy Nathanson (13), Rep. Julie Fahey (14)
- **Senators:** Sen. Floyd Prozanski (4), Sen. Arnie Roblan (5), Sen. Lee Beyer (6), Sen. James Manning (7)

FAST FACTS

- **1,573 4th/5th graders** received **6 weeks** of programming lessons from their teacher & a woman from our local tech community
- **5,432 hours** of professional development delivered to educators
- **187 industry partners** involved in some capacity

Spotlight Initiative: ELEVATE LANE COUNTY

Elevate Lane County places Lane County high school educators in work-based learning experiences over the summer months. Since its inception, 11 educators from 13 different high schools in eight school districts have spend 4,000+ hours with 23 different companies. Externships are a key component in developing students who are in touch with the demands of the workplace and the skills—both technical and professional—that they need to be hired as successful employees. Educators who are exposed to the culture and values of an industry become more prepared to implement curriculum that is beneficial to student preparation.

Contact: Heidi Larwick, Director, Lane STEM; hlarwick@lesd.k12.or.us, 541-461-8280

- **Counties Served:** Benton, Linn
- **Representatives:** Rep. Marty Wilde (11), Rep. Shelly Boshart Davis (15), Rep. Dan Rayfield (16), Rep. Sherrie Sprenger (17), Rep. Mike Nearman (23)
- **Senators:** Sen. Arnie Roblan (5), Sen. Lee Beyer (6), Sen. Sara Gelser (8), Sen. Fred Girod (9), Sen. Jackie Winters (10); Brian Boquist (12)

FAST FACTS

- **75 high schoolers** attended Metals & Manufacturing for Women & All High School Students Day (2019)
- **27 high schoolers** participated in 10-week Central Electric Training Center *Trades Academy* course (2018)
- **23 teachers/counselors** participated in a summer externship at several manufacturing companies (2018)

Spotlight Initiative: MANUFACTURING DAY

The Albany Chamber of Commerce is a Mid-Valley STEM-CTE Hub partner and operates a workforce development program called *Pipeline* that links educators to local business and industry providing teachers and their students' authentic work-based learning experiences. The program is funded by industry partners. Sponsored by the Mid-Valley STEM-CTE Hub and *Pipeline*, Manufacturing Day was held on October 5, 2018. Two-hundred middle school students and their teachers from 13 school districts toured manufacturing sites, met employees, and learned about careers, math, science, engineering, and technology in a real world, workplace setting. They also toured Linn-Benton Community College Career and Technical Education manufacturing programs (e.g, Welding and Nondestructive Testing).

Contact: Susan Patterson, Director, Mid-Valley STEM-CTE Hub; patters@linnbenton.edu, 541-917-4477

- **Counties Served:** Clatsop, Columbia, Tillamook
- **Representatives:** Rep. Tiffiny Mitchell (32), Rep. Brad Witt (31)
- **Senators:** Sen. Betsy Johnson (16)

FAST FACTS

- Professional development provided to **47 school employees** impacting an estimated **1,765 students** (2018)
- Clatsop Career & Job Fair partner attended by **6 school districts**, **650 students** & **73 employers** (2018-19)
- **13 career-connected learning field trips** with a total of **26 impacted educators** and **260 impacted students** (2018-19)

Spotlight Initiative: CLATSOP WORKS

The Northwest STEM Hub has been actively engaged in promoting a Career Connected Learning initiative throughout our region, which includes Clatsop, Columbia, and Tillamook counties. This work includes developing Clatsop Works, a paid, summer internship program for youth in Clatsop County. Clatsop Works recruits students from the county's five school districts Astoria, Warrenton-Hammond, Seaside, Knappa, and Jewell, along with engaging Clatsop Community College students and programs. During the summer of 2018, Clatsop Works had 56 applicants, 16 interns employed full time, 11 host employers, and 7 professional development workshops for the interns. Clatsop Works is currently preparing for summer of 2019 and thus far, we have 90 applicants and 30 host employers. The program continues to grow in Clatsop County with overwhelming community support and progress is being made on scaling and replicating the Works programs in Columbia and Tillamook counties.

Contact: Myronda Schiding, Director, Northwest STEM Hub; mschiding@nwresd.k12.or.us, 503-614-1685

- **Counties Served:** Clatsop, Coos, Curry, Douglas, Lane, Lincoln, Tillamook
- **Representatives:** Rep. David Brock Smith (1), Rep. Caddy McKeown (9), Rep. David Gomberg (10), Rep. Tiffiny Mitchell (32)
- **Senators:** Sen. Dallas Heard (1), Sen. Arnie Roblan (5), Sen. Betsy Johnson (16)

FAST FACTS

- Collaborates with more than **60 partners**, including 21 school districts, 6 postsecondary education institutions, 13 community organizations, 7 businesses, 6 government agencies, 5 centers, one regional achievement collaborative, and one Confederated Tribe
- Through its partnerships, provided **22,000 contact hours** of student STEM experiences
- Through its partnerships, provided **9,020 teacher professional development contact hours**

Spotlight Initiative: SUMMER 2018 HIGH SCHOOL INTERNSHIPS: PORT ORFORD GRAY WHALE FORAGING ECOLOGY RESEARCH

For the first time, Port Orford high school students participated in community-based summer internships where they worked shoulder to shoulder with Hatfield Marine Science Center researchers and OSU students on the gathering of data on gray whale habitat use and zooplankton community structure. One intern reflected: "So far I have gained skill after skill in this internship. I got CPR certified, took a kayak training class, learned how to use a theodolite, and have spent many educational (and frustrating) hours entering data in Excel…It surprised me that I was developing a relationship with the whales I'm researching. By the end of August I'm now sure that I will also know many of the whales by name…and I will have had my first taste at what being a scientist is like." Visit https://www.youtube.com/watch?v=mhgutfz8PGY for a video about the experience.

Contact: Lisa Blank, Director, Oregon Coast STEM Hub; lisa.blank@oregonstate.edu, 406-370-6084

- **Counties Served:** Multnomah, Washington
- Representatives: Rep. Courtney Neron (26), Rep. Sheri Schouten (27), Rep. Jeff Barker (28), Rep. Susan McLain (29), Rep. Janeen A. Sollman (30), Rep. Brad Witt (31), Rep. Tiffiny Mitchell (32), Rep. Mitch Greenlick (33), Rep. Ken Helm (34), Rep. Margaret Doherty (35), Rep. Jennifer Williamson (36), Rep. Andrea Salinas (38), Rep. Karin A. Power (41), Rep. Rob Nosse (42), Rep. Tawna D. Sanchez (43), Rep. Tina Kotek (44), Rep. Barbara Smith Warner (45), Rep. Alissa Keny-Guyer (46), Rep. Jeff Reardon (48),
- **Senators:** Sen. Brian Boquist (12), Sen. Mark Hass (14), Sen. Chuck Riley (15), Sen. Betsy Johnson (16), Sen. Elizabeth Steiner Hayward (17), Sen. Ginny Burdick (18), Sen. Lew Frederick (22), Sen. Michael Dembrow (23), Sen. Laurie Monnes Anderson (25), Sen. Chuck Thomsen (26)

FAST FACTS

- Estimated **79,031 students** benefited from professional development provided by Portland Metro STEM Partnership (PMSP) to educators
- Partnered with school districts to develop NGSS-aligned Physics first 3-year high school science curriculum and teacher professional development currently being piloted or implemented in **17 districts** across Oregon, reaching **32% of all high school students**
- **Leveraged $2,725,000** during the 2017-19 biennium to support STEM education in the PMSP region

Spotlight Initiative: STE(A)M Transformation Schools

The Portland Metro STEM Partnership has been working with schools that wanted to become STE(A)M Transformation Schools since our inception. STE(A)M schools provide rich STE(A)M learning environments that foster student STEM identity by helping students apply their learning in real-world, local contexts, where they are the problem solvers, designers, engineers and investigators. Working at the school level, we help schools transform their culture and way of engaging students that lasts when administrator and staff changes occur. To learn more about STE(A)M schools, visit our website at http://www.pdxstem.org/stem-schools and view a short video of one school's journey. Our implementing STE(A)M schools have reached approximately 10,000 students to date.

Contact : Jerian Abel, Co-Director, Portland Metro STEM Partnership ; jerian.abel@pdxstem.org, 971-238-8813
Kristen Harrison, Co-Director, Portland Metro STEM Partnership ; kristen.harrison@pdxstem.org, 971-238-2050

- **Counties Served:** Jackson, Josephine, Klamath
- **Representatives:** Rep. David Brock Smith (1), Rep. Gary Leif (2), Rep. Carl Wilson (3), Rep. Duane Stark (4), Rep. Pam Marsh (5), Rep. Kim Wallan (6), Rep. Mike McLane (55), Rep. E. Werner Reschke (56)
- **Senators:** Sen. Dallas Heard (1), Sen. Herman Baertshiger Jr. (2), Sen. Jeff Golden (3), Sen. Dennis Linthicum (28)

FAST FACTS

- **306 educators** participated in **5,872 hours** of Hub professional development and/or programs, impacting an estimated **8,020 students**
- Engaged **43 industry volunteers** in **864 hours** of Hub activities
- **880 students** participated in **5,213 hours** of Hub supported programs

Summer STEAM Camps

In 2018, the Southern Oregon STEM Hub hosted 16 week-long camps for 382 students between the 2nd and 9th grades. The Hub focused its recruitment efforts for the camps on reaching underserved students: those who rarely have access to or can afford such opportunities. As a result, 38% of those students identified as Hispanic and 85% were economically disadvantaged.

Contact: Debbie Vought, STEM Program Manager, Southern Oregon STEM; debbie_vought@soesd.k12.or.us, 541-776-6766

- **Counties Served:** Clackamas, Marion, Polk, Yamhill
- **Representatives:** Rep. David Gomberg (10), Rep. Sherrie Sprenger (17), Rep. Rick Lewis (18), Rep. Denyc Boles (19), Rep. Paul Evans (20), Rep. Brian Clem (21), Rep. Teresa Alonso Leon (22), Rep. Mike Nearman (23), Rep. Ron Noble (24), Rep. Bill Post (25), Rep. Courtney Neron (26), Rep. Rachel Prusak (37), Rep. Andrea Salinas (38), Rep. Christine Drazan (39), Rep. Mark W. Meek (40), Rep. Karin Power (41), Jeff Reardon (48), Janelle Bynum (51)
- **Senators:** Sen. Fred Girod (9), Sen. Jackie Winters (10), Sen. Peter Courtney (11), Sen. Brian Boquist (12), Sen. Kim Thatcher (13), Sen. Rob Wagner (19), Sen. Alan Olsen (20), Sen. Kathleen Taylor (21), Sen. Shemia Fagan (24), Sen. Chuck Thomsen (26)

FAST FACTS

- Engaged **770 industry volunteers** in more than **1,400 hours** of classroom visits, industry tours & teacher/administrator professional development (2017-19)
- Provided **3,200 hours** of professional development to over **600 educators** impacting an estimated **37,830 students** (2017-19)
- Increased enrollment in high school STEM/CTE electives by **13%** - 22% among Hispanic/Latino students, 17% among English Language Learners, 16% among students receiving free/reduced lunch; increased enrollment in STEM accelerated credit (AP, IB, Dual Credit) courses by 2% (2014-15 to 2015-16)

Spotlight Initiative: OREGON CONNECTIONS

Oregon Connections, powered by Nepris, brings learning to life though a web-based tool that pairs classrooms with industry professionals for real-time virtual and in-person interactions. Developed by the South Metro-Salem STEM Partnership and expanded statewide, teachers request local experts to engage in classroom experiences, or tap into a nationwide network of over 40,000 professionals of diverse backgrounds for virtual experiences. Oregon Connections has reached 15,000 students through more than 300 experiences. It is a powerful tool for rural communities, helping to address the inspiration gap that persists for students outside the metro corridor. It is an emerging game-changer for underserved youth, exposing them to jobs and careers outside of their lived experience, and to successful people who look like them who have pursued those paths. Oregon industry volunteers have impacted more than 30,000 students across the nation, raising visibility of Oregon companies and supporting the state and national STEM pipeline.

Contact: Melissa Dubois, Director, South Metro – Salem STEM Partnership; melissa.dubois@oit.edu, 503-821-1169

- **Counties Served:** Douglas
- **Representatives:** Rep. David Brock Smith (1), Rep. Gary Leif (2), Rep. Cedric Hayden (7)
- **Senators:** Sen. Dallas Heard (1), Sen. Floyd Prozanski (4)

FAST FACTS

- **129 educators** received ≥ **1,120 hours** of professional development, impacting an estimated **3,050 students**
- At least **439 students** participated in **12,544 contact hours** of Hub-supported STEM programs (2018-19)
- **131 educators** are registered users of the STEAM Resource Lending Library, impacting at least **4,450 students** through lending library resources.

Spotlight Initiative: BRIGHT FUTURES UMPQUA

As part of the Bright Futures Umpqua Initiative (expanding STEAM Career Connected Learning experiences for students), the Umpqua Valley STEAM Hub (UVSH) has led the planning and delivery of middle school summer camps promoting STEAM careers and linked to local high school CTE programs. 144 middle school youth from across Douglas County participated in week long Expanding Horizons camps in 2018 focused on manufacturing and technology, drafting and production, business entrepreneurship, the Trades and Natural Resources. Eight total camp weeks were offered. In 2016 and 2017, 266 students participated. 60% represent underserved populations. Camp offerings will expand this summer to include healthcare careers. Students participate in projects and activities led by trained staff and representatives from business and industry. When possible, tours to industry sites are included. Partners include Umpqua Community College, the Douglas ESD, the National Guard, Wolf Creek Job Corps, DR Johnson Lumber Company, ORENCO Systems, Inc., and local school districts.

Contact: Gwen Soderberg-Chase, Co-Director, Umpqua Valley STEAM; gwen.soderberg-chase@umpqua.edu, 541-784-8622

STEM INNOVATION GRANTS

HISTORY AND PURPOSE

In the 2015-17 biennium, the State Legislature allocated $4,500,000 for STEM Innovation Grants. These grants are designed to expand the implementation of effective programs related to STEM and propose innovative approaches or programs that provide professional development to transform instruction within the STEM disciplines. Funding for the first round of grants was divided amongst four STEM Innovation Grant programs:

1) Providing professional development around applied mathematics to educators of grades 7 through 10

2) Identifying and piloting computer-based adaptive learning environments for K-8 students

3) Providing professional development around digital literacy to educators of grades 7 through 12

4) Partnering with existing out-of-school STEM programs to expand out-of-school opportunities for STEM learning in grades 4 through 8

In the 2017-19 biennium, the Legislature reduced funding for STEM Innovation Grants to $4,430,000.

2017-19 GRANTS

In the 2017-19 biennium, the STEM Investment Council and Department of Education decided to continue funding three out of four original STEM Innovation Grant Programs: Math in Real Life, Digital Literacy and Computer Science Innovation, and STEM Beyond Schools. Descriptions of each program follow.

Math in Real Life
Math in Real Life (MiRL) supports the expansion of regional networks to create an environment of innovation in math teaching and learning. The focus on applied mathematics supports the natural interconnectedness of math to other disciplines while infusing relevance for students. MiRL supports a limited number of networked math learning communities that focus on developing and testing applied problems in mathematics. The networks help math teachers refine innovative teaching strategies with the guidance of regional partners and the Oregon Department of Education.

Digital Literacy and Computer Science Innovation
The Digital Literacy and Computer Science Innovation grant supports professional development for digital literacy and computer science teachers of grades 7 through 12. In addition, the grant supports the development of a statewide framework for digital literacy and computer science.

STEM Beyond School
STEM Beyond School (SBS) works with local community providers across Oregon to offer 50 hours or more of engaging STEM programming for students in grades 3 through 8, with 70% or more participation by historically underserved students: students of color, students in poverty, students with disabilities, and English language learners. Program partners leverage out-of-school time to expand learning opportunities for students. SBS provides over 50 hours of professional development to participating educators to build capacity for STEM programming long term. SBS also formed and supports a statewide network of community-based out-of-school STEM learning providers.

Appendix C includes additional information on the 2017-19 STEM Innovation Grants.

CONCLUSION

Oregon has taken crucial steps toward creating a strong and vibrant STEM Ecosystem. The establishment of the STEM Investment Council – codifying the essential advisory role of industry in STEM policy development – gave this cross-sector work a home. The STEM Education Plan provides the blueprint for reimagining and transforming how we spur interest in, increase attainment of, and broaden opportunities for our learners. The Regional STEM Hub Network – up and running throughout nearly the entire state – is truly moving the needle as the Hubs implement the STEM Education Plan in their communities. Through their partnerships with business, education, community organizations, and elected officials, the STEM Hubs are creating real and lasting change. The STEM Innovation Grants have created content, material, and approaches that introduce new ways of teaching kids in STEM and lead to better STEM outcomes throughout the state.

While the high-level data may not yet reflect systemic change, we must recognize the importance of the regional success stories blossoming around the state. Oregon is still in the early stages of this work and now we have the infrastructure and momentum needed to scale it up. We must continue these efforts if we are to improve student outcomes and create pathways to high-wage, high-demand jobs, while preparing our students to be life-long learners.

APPENDIX A: REGIONAL STEM HUB FACT SHEETS

1. CENTRAL OREGON STEM HUB

Central Oregon STEM HUB

STEM HUB Structure and regional priorities:

The Central Oregon STEM Hub went through a leadership change in 2018. The Hub was without a director from January-May of 2018. This created an idol period for the existing STEM Hub personnel but they continued to work under the CTE & STEM Department umbrella to complete existing programing. A new Executive Director was hired in May. She was previously the CTE Instructional Specialist in the Department so this strengthened the relationship of CTE and STEM and how they work together while solidifying its place as one of the only Hubs in the State that fall in a CTE and STEM department. We have a close relationship with EastCascade Works (Regional Workforce Investment) and align our priorities to the work in our region. We continue to be highly connected to the implementation of the State STEM Education Plan, and our focusing this biennium on Computer Science, NGSS and Elementary Science Time, CTE-STEM Middle school alignment and career connected learning. We have done a lot of work building partnerships and industry connection, there has been a minimal connection to k-16 and we have worked hard in this past 9 months to change and build those relationships. Here is a list of some big wins:

NGSS/Elementary Science Time:

As part of the monthly regional curriculum directors meeting, the Central Oregon STEM Hub was able to influence curriculum directors to choose STEM in elementary as one of two regional goals. This priority has lead to a partnership with the Oregon Science Project to build a learning collaborative for K-5 teachers to dive into NGSS Science and the relationship with new regional curriculum. Additionally, a group of champions are working to crosswalk the science curriculum with literacy curriculum to find areas of integration as a way to increase science time. The STEM Hub has also partnered with the Bend Science Station to provide additional Professional Development opportunities for 4th and 5th grade regional teachers. This work is all reinforced and enhanced by the purchase of additional kids and housed in our STEM Library.

K-16 Computer Science Pathways:

The K-16 Computer Science (CS) Taskforce group that is made up of industry partners including the Head of the Technology Association of Oregon (TAO) Central Oregon, our regional post-secondary partners of OSU Cascades and COCC, Regional Curriculum directors, Tech Directors, Superintendents, Administrators and Teachers. These folks are all Champions of empowering teachers to explore the study and skills of software development, information technology, and the role and impact of computing in society to students of all ages within the context of math, reading, science, the arts, history, civics and fun. This collaboration has been in place for just over a year to prioritize building Computer Science pipeline and integration in our schools to align with growing industry demand in our region. The taskforce has identified CS Champions, defined CS education and integration, vetted curriculum, and are providing unique student involved teacher PD like Makeathons and Educator Externships. The momentum this taskforce has, lead to some identifiable quick wins including going from 1 middle school with a CS elective to 12 schools with district allotted collaboration time, increased 1 to potentially 5 new CTE CS Programs of Study, partnering with Lane STEM Hub and ODE for $642K grant for CS pre-apprenticeship work to impact rural schools across the state. With strong teacher champions at the middle school level, we leverage those resources to push demand to the high school.

CTE-STEM Middle School Electives

The STEM Hub are currently working with Elton Gregory Middle School (EGMS) and Sky View Middle School (SVMS) to reimagine the electives offered for next year and being mindful of the alignment and offering with aligning high school. Elective teachers from middle schools and two CTE teachers from the high school will intentionally go through a Design Thinking workshop (Partnership with Stanford D. School) as a team to start to work with alignment and integration of programs. Additionally, EGMS and SVMS have identifies a Computer Science champion in the building that will take part of professional development opportunities identified and offered by the CS Taskforce.

Career Connected Learning (CCL) Programming

Career Connected Learning has been a founding tenant of the STEM Hub and a vital component of our work. With every educational opportunity we provide or connect both teachers and students to, we find a way to connect industry and career opportunities for those involved. In the past three years, we have had a lot of regional success with provide CCL programs for CTE high school teachers and students who have already identified a unique pathway like Health, Natural Resources and/or manufacturing and engineering fields. We are able to partner with Regional CTE to get this work done and give students hands on experiences to learn what it is like to work in that industry and not just hear about it. These workshop and experiential career fairs have become a staple and a defining characteristic in the type of CCL opportunities we provide for students. The quality and success of the high school career exploration events have both set a standard and created ease in industry buy in and recruitment. We have found that the need for this career exploration needs to be done prior to this high school experience. CTE funds do not reach below 9th grade so the STEM Hub is working hard to create that pipeline for CTE programs in high school and early exploration at the middle school level. All of these events are done intentionally to provide unique learning opportunities about careers in CTE/STEM Fields and many of them are done at a strategic time of the year to encourage enrollment in CTE pathways.

We have invited Middle School Counselors to the CTE/STEM Counselor training to help educate them on the success rates of students who invest time in these programs to provide the counselors with the tools to speak about and be true advocates of both CTE/STEM and applied learning. This has helped us fill capacity for these events and get targeted schools and populations to attend for strategic access to these events.

Important Data:

Number of educators who participated in Hub PD or programs	583
Number of educator hours spent in Hub PD and programs	4,448
Project number of students impacted by educator PD participation	33,830
Number of industry volunteers who participated in Hub activities	1,076
Number of industry volunteer hours	5,557
Number of students who participated in Hub directed programs	10,986
Number of student hours in Hub directed programs	27,345

2. COLUMBIA GORGE STEM HUB

Columbia Gorge
STEM HUB
SCIENCE, TECHNOLOGY, ENGINEERING, & MATHEMATICS

The Columbia Gorge STEM Hub serves as a central point for communication & cooridnation for STEM Education (Science, Technology, Engineering, & Math). We partner with a **regional network of schools, nonprofits, businesses, & civic leaders** working to increase STEM opportunities for all students in the Gorge. Collectively we are striving to develop a career-ready, diverse, adaptable workforce.

WHO WE WORK WITH & SUPPORT:

- Students (PreK - college) & Families
- Educators
- Businesses & Nonprofits

In the counties of

- Hood River, Gilliam, Sherman, Wasco & Wheeler (Oregon)
- Klickitat & Skamania (Washington)

WE COLLABORATE WITH CROSS-SECTOR PARTNERS FROM EDUCATION, INDUSTRY, & NONPROFITS TO PROVIDE:

*"**STEAM Skills**...have become essential to fully participate in modern democratic society and **are the gateway to high-wage, high-demand jobs** that will drive Oregon's prosperity..."*
- Governor Kate Brown, STEAM Week 2018 Proclamation

The **Columbia Gorge STEM Hub** is one of a 13 member statewide STEM Hub Network, supported by the Oregon Dept of Education.

STEM JOBS ARE THE ECONOMIC DRIVERS IN OUR REGION

3 OF THE 5 LEADING INDUSTRIES IN THE GORGE ARE STEM-RELATED

MANUFACTURING

HEALTHCARE

AGRICULTURE

OTHER TOP 2:
GOVERNMENT
HOSPITALITY/RETAIL

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Significant Projects 2017-19

STUDENT PROGRAMS

CHIEF SCIENCE OFFICERS:

- National student leadership program supported by NSF. Collaboration with STEM Hubs in Eastern & Southern Oregon.

STEM NIGHTS:

- Hands-on family events at elementary schools to raise awareness of STEM Careers. Large impact (>1000 students/yr) & highly cost-effective.

MAKER CLUBS:

- Year-long curriculum developed by STEM Hub. Funded by national "US 2020" grant. 8 sites.

OTHER EFFORTS INCLUDE:

- Family STEM Kits, Intro to Engineering events, and supporting partner events.

EDUCATOR SUPPORT

MICROGRANTS TO EDUCATORS:

- 26 innovative projects funded in 4 counties. Estimated students impacted: 2,952
- >80% of students impacted come from at least one population underrepresented in STEM

OTHER EFFORTS INCLUDE:

- Annual STEM Symposium (teacher professional development) and STEM Lending Library, and lesson plan archive.

REGIONAL COLLABORATION

GORGE STEM FAIR:

- Regional event bringing together businesses, schools, and local organizations to celebrate STEM in the Gorge.
- Financially self-sustaining (supported by sponsors) and large reach.

OTHER EFFORTS INCLUDE:

- Monthly newsletters, regular partner meetings, collaborative grants, networking events, and supporting partner events.

Christy Christopher, STEM Hub Director | 541-296-2046 | gorgestem@cgesd.k12.or.us | www.gorgestem.org

3. EAST METRO STEAM PARTNERSHIP

East Metro STEAM Partnership: 2017-2019

Summary

The vision of the East Metro STEAM Partnership is an East Multnomah County community where children, youth, and adults have equitable access to and are engaged in Science, Technology, Engineering, Art, and Math (STEAM) learning that results in a skilled workforce and increased economic opportunity. EMSP focuses on the Eastern part of Multnomah County, a region representing 5 school districts, 43,000 students, 2,000 teachers, and the most diverse and economically challenged residents in the state of Oregon. Incomes are 68% higher in West Portland than East Portland and more than three times as many people hold college degrees in the west compared to the eastern part of the metropolitan area, according to the 2016 US Census, American Community Survey.

EMSP is governed by a Leadership Team consisting of community leaders in education, the trades, industry, and community organizations. At the direction of the Leadership Team, the Director convenes 50+ partners every other month, conducts an annual needs assessment, and serves as the point of contact for the region's STEAM efforts. In a distributed leadership model, five action teams comprised of committed partners (see image below), work together to move the region toward EMSP's vision.

Impact Data

- 148 educators received a total of 1,362 professional development hours, reaching an estimate of 28,245 students as a result.
- 625 students participated in EMSP-supported or EMSP-funded programs, resulting in 21,419 hours of STEAM.

Selected Initiatives

STEM Leadership Academy for Administrators [State STEM Plan Goal Areas 1-4]

- 10-month learning opportunity for elementary building principals and their supervisors to deepen their understanding of STEM teaching & learning, effective leadership models that support high academic achievement, and tools & resources to support their role.
- 22 administrators across six districts, served by three STEM Hubs: PMSP as lead, with support from EMSP and SMSP.
- More info: http://bit.ly/STEM-leadership-academy

Pockets of Innovation [State STEM Plan Goal Areas 1-3]

- Funded 15 projects in 2017 and an additional 5 projects in 2018 with the purpose of raising awareness around current STEAM projects in the region.
- In 2017, an evaluation was completed by NPC Research, and MetroEast Community Media created three videos highlighting the projects, closed captioned in three languages.
- More info: https://eastmetrosteam.org/pockets-of-innovation/

Industry for a Day [State STEM Plan Goal Areas 1-3]

- In 2018, in collaboration with All Hands Raised, Worksystems, and Impact NW over 200 educators visited 38 industry sites and experienced firsthand what jobs are available in the east metro area as well as what employers are looking for.
- Information from companies was compiled into a Company Overview Booklet. Attendees also indicated which actions they would follow up on over the course of the school year.

STEM Beyond School [State STEM Plan Goal Areas 1-3]

- Each site serves 30 or more youth in grades 3-8 for at least 50 student hours. At least 70% of students are underserved. Staff at each site participates in 70 professional development hours.
- Metropolitan Family Services hosts a site through its SUN School at West Powellhurst Elementary (David Douglas School District).
- Saturday Academy hosts a site through a winter and spring class at three locations: Hall Elementary School (Gresham-Barlow School District), Woodland Elementary School (Reynolds School District), and Walt Morey Middle School (Reynolds School District) as well as a spring break camp at Mt. Hood Community College.

Youth in STEAM Communications [State STEM Plan Goal Area 1]

- Collaboration in which Center for Advanced Learning digital media and design students set the strategy and creation of EMSP communications materials through paid internships at Lewis Creative and MetroEast Community Media
- In 2018, six student interns produced a promo video, STEAM banners, social media messages based on major audience profiles and a content strategy.
- In 2019, additional students will develop a photojournalism project, a brochure, motion graphics based on the films, and a passport for STEAM activities in the region.

Youth Advisory Council [State STEM Plan Goal Area 1]

- Youth Advisory Councils have taken place twice per year since spring 2017, engaging up to 15 youth age 13-20 from throughout the East Metro region, paying them to influence their peers by spreading information and activities about STEAM in their schools and community.
- More info: https://eastmetrosteam.org/youth-advisory-council/

4. FRONTIER STEM HUB

Frontier STEM Hub
Malheur Educational Service District
January 2019

The Frontier STEM Hub is a culturally responsive and multi-sector initiative that involves both formal and non-formal education, community-based organizations, and industry partners. The Frontier STEM Hub serves Malheur County, the poorest, most disadvantaged county in the state with the highest child poverty rate of nearly 35% compared to Oregon's 20%. In 2012, the Regional Achievement Collaborative (RAC), Poverty to Prosperity (P2P), was formed with the goal of increasing economic vitality for the region. The Frontier STEM Hub was formed in the fall of 2016 as a key component of P2P. Ten school districts with a public school population of 7,430 k12 students are supported by this STEM partnership. In 2015/16 the population of the county was 62% white and 38% non-white. The largest non-white group was Latino students, at 33%. In Malheur County, just under 14% of adults over age twenty-five have at least a Bachelor's degree or higher, compared to Oregon's rate more than double at 31%. County test scores also indicate historically low achievement in STEM-related subject areas. In addition to the issues around student achievement and poverty, Malheur County school districts, especially the remote rural districts, often experience limited access to quality STEM opportunities, teacher training, and resources.

Mission:
The mission of the Frontier STEM Hub is to support, develop, and promote quality Science, Technology, Engineering, and Math (STEM) education for all students in Malheur County to advance Oregon's 40-40-20 goal for students to achieve college and career readiness resulting in long-term economic growth and increased competitive and creative capacity for our region.

Vision:
Through the Frontier STEM Partnership, we envision STEM education in Eastern Oregon that inspires and empowers all learners to develop knowledge, skills, and mindsets necessary to adapt and contribute to and succeed in an increasingly complex and technologically rich society, building our shared prosperity and economic vitality.
To achieve this vision, the Frontier STEM Partnership has identified the following four goals:

1. Support, develop, and promote formal and informal STEM-learning opportunities, increasing exposure and interest of P20 students to increase proficiency, interest, and attainment of post-secondary credentials and degrees in STEM and CTE
2. Continuously improve the effectiveness of STEM education through quality professional development
3. Strengthen industry and Career Technical Education (CTE) partnerships that will increase graduation rates with students who are prepared and on track to pursue college and career pathways
4. Create, develop, and sustain an equity committee to ensure that the initiatives of the Frontier STEM Hub incorporate and adopt the principles of Oregon's Equity Lens, ensuring quality, culturally-responsive educational opportunities for all students of Malheur County

The Frontier STEM Hub leverages the work of collective impact to achieve these goals.
From this work, several initiatives and projects have been created. Two of which recently received national recognition from the National Association of Extension 4-H Agents: Malheur Youth (MY) Health Science Day and Malheur Youth (MY) Aviation STEM Field Day.

For the past two years, Frontier STEM Hub, Oregon State University Extension, and Malheur ESD have partnered with Treasure Valley Community College, Saint Alphonsus Medical Center, and the school districts of Malheur County to engage over 700 seventh-grade youth in the Malheur Youth (MY) Health Science Days. All 7th graders of Malheur County were invited and every school attended. The overall goal of the program was to increase the students' knowledge, awareness, and aspirations toward STEM-related health care careers and pathways. To achieve this goal, students interacted with industry and community health professionals, college faculty, and nursing students, as they engaged in six hands-on sessions

introducing them to STEM as it relates to health science. For this work, MY Health Science Day received the national award for Excellence in Workforce Development Programming.

A second program developed is Malheur Youth (MY) Aviation STEM Field Days. The Frontier STEM Hub, Oregon State University Extension, OSU Open Campus, University of Idaho Extension, Frazier Aviation, Treasure Valley Community College Aviation Program, and Grant County Regional Airport collaborated with community partners to deliver interactive Aviation field days in Malheur and Grant Counties. Approximately 600 sixth-grade students per year spend the day at the municipal/regional airports to investigate the various careers associated with aviation. These collaborative efforts were recognized with the national award for Excellence in Science, Technology, Engineering, & Math.

These programs were developed, in part, to ensure that all students in Malheur County have access to high quality STEM learning experiences regardless of whether they attend a rural or remote rural school district.

Robotics opportunities is another area that the Frontier STEM Partnership has focused on to reduce barriers to entry for rural youth. Through focused professional development, equipment lending programs, mini-grants for team and tournament registrations, and organized scrimmages for rookie teams to gain experience, the number of competitive FIRST LEGO League teams in Malheur County has increased from 2 in the 2015/16 school year to 21 teams in 2018/19. Furthermore, eight schools are now providing non-competitive LEGO robotics learning opportunities either during class time or out-of-school STEM programs where there were none previously available.

In addition, the Frontier STEM Hub is proud to support the Chief Science Officers (CSOs) program. In its first year in Malheur County, the program consists of 16 peer-elected youth from three area high schools. The goals of the CSO program are to:

- Create a pipeline of diverse STEM leaders
- Increase communication and collaboration among CSOs
- Enrich school STEM culture and career awareness
- Increase student voice in STEM conversations within the community

This program seeks to create change makers and leaders through mentoring, networking, and collective action.

The data below confirms that the Frontier STEM Hub is fulfilling the vision of the hub. During the 2017/2019 biennium, over 10,000 students participated in STEM programs supported by Frontier STEM., Throughout the biennium, the Frontier STEM Partnership provided just under 6,000 hours of professional development to 824 educators. In addition, due to the limited access to STEM resources across our county, it has been a focus of the Frontier STEM Hub to provide an equipment lending program. Through the biennium, 180 teachers utilized this resource, benefitting nearly 5,000 students.

	Number of educators who participated in Hub PD or programs	Number of educator hours spent in Hub PD and programs	Project number of students impacted by educator PD participation	Number of students who participated in Hub support programs	Number of student hours in Hub support programs	Estimate of students who benefit from equipment loaning programs	Estimate of teachers who benefit from equipment loaning programs
Frontier STEM Hub	824	5,764	13,354	10,626	32,423	4,960	180

By achieving these goals, the STEM Hub is advancing its mission of supporting, developing, and promoting quality STEM education for all students of Malheur County.

5. GO-STEM

GO·STEM

Greater Oregon Science Technology Engineering & Math

ABOUT

Vision

Greater Oregon (GO) STEM is a regional partnership that values STEM learning, prepares youth for successful STEM careers, and builds pathways and pipelines to meet workforce needs.

Area

GO STEM serves almost 30% of Oregon's geographical area. Its 7 eastern Oregon counties are Baker, Harney, Grant, Morrow, Umatilla, Union, and Wallowa. Despite its large area, the region's population is relatively low and very disperse—out of the region's 36 school districts, 30 (88%) are in areas classified as "rural".

Each county in eastern Oregon is unique and has its own distinctive needs. However, commonalities around the region include rural living, an abundance of public lands, and a history of natural resource based economies (primarily logging, agriculture and ranching). GO STEM's mission is to employ these commonalities and align shared values, which will lead to a thriving workforce, career-ready rural youth, and regional prosperity.

STRATEGY

GO STEM's work is focused around the following three strategies for long-term success.

STEM Awareness, Pipelines & Pathways: Develop a STEM workforce that includes a variety of opportunity for different educational levels.

To accomplish this, GO STEM increases collaborations between employers and educational institutions. The collaborations serve to identify and develop specific skillsets needed to fill current and projected workforce gaps, and also help educate youth on regional STEM opportunities.

STEM Systems for Education: Ensure quality STEM educational offerings across Eastern Oregon. This will increase the number of regional high school graduates with full-time employment plans or post-secondary educational plans related to STEM fields.

To accomplish this, GO STEM works with educators and educational institutions to provide professional development, increase STEM exposure and accessibility to STEM resources.

Communicating Rural STEM Perspectives, Needs, Solutions and Opportunities: Communicate rural values and needs between employers, educators, students, and government.

To accomplish this, GO STEM facilitates ongoing discussions between entities to ensure that rural areas are seen as valuable contributors to statewide learning and growth. There is commonality in the geographic isolation of these small populations along with similar economic and educational issues. Coming together to address regional concerns allows the region to benefit from the sharing of perspectives, resources, and experiences.

GO·STEM

Greater Oregon Science Technology Engineering & Math

HIGHLIGHTS

Programming

STEM Coaching

GO STEM is piloting a STEM coaching model with one of its school districts. The STEM coaching aims to improve classroom delivery of STEM-related topics, and to help teachers effectively integrate Next Generation Science Standards into their curriculum. GO STEM's designated science coach is actively working with 28 K-6 teachers, with plans to add middle school teachers in the near future. Teachers participate in individualized sessions where they receive curriculum review, support, and work together to integrate hands-on STEM in non-traditional ways. The school district reports positive teacher feedback, increased confidence teaching science and math, and improved STEM engagement. GO STEM will continue to expand this program and anticipates its eventual implementation as a region-wide STEM educational model.

Chief Science Officers

GO-STEM participates in the nationwide Chief Science Officer (CSO) Program. CSOs are high school students who choose to serve as local STEM leaders. Each CSO completes an independent or team project in their area of passion.

In 2018:

- There were 21 CSOs and 9 advisors across 6 counties
    - Each CSO disperses information throughout their community and school
    - Male and female participation is roughly equal
- CSOs from across the state attended:
    - Leadership Institute (2 day event, hosted at EOU)
    - Regional trainings and networking events
- CSOs arranged and hosted Dinner with a STEM Professional, which provided opportunities to learn from and network with different industry professionals from across the region
    - 25 students, 18 teachers, 15 VIPs, and 8 STEM professionals were in attendance

Numbers

Within the 2017-2019 biennium:

- 1,634 total hours of teacher training provided to 240 educators
- 3,723 total hours of student participation provided to 357 students in supplementary (out of school) programs/events
- 352 total hours of participation donated from 70 industry professionals

6. LANE STEM

LANESTEM

Lane STEM Youth Voice

STEM Equity Council

Program Description

Lane STEM's Youth Voice program, the STEM Equity Council, had its first pilot session during the first half of 2018. Five high schools from the northern region of Lane County participated; one adult ally from each school selected six or more students from grades 9-11 and attended two sessions. The goals of the program were to allow students the space to discuss their experiences with STEM in and out of school, as well as examine data surrounding what students are accessing STEM courses at their school compared to the county. Several students from the STEM Equity Council participated in the state STEM convening hosted at Lane Community College in March. Future directions for the group's work include more widespread project-based learning; real-world applications and career-focused instruction, especially for health occupations; and cross-district dialogue on sharing resources (robotics, CTE courses) and exploring other schools/buildings.

Equity Council Fast Facts

- High Schools: Mohawk, Elmira, Junction City, North Eugene, and Churchill
- At 4 out of 5 participating high schools, students met with their adult allies in between sessions discuss STEM and Equity topics relating to their schools.
- Students at Junction City conducted a survey of their classmates to see how they understood STEM and what experiences they have had with STEM.
- Students at North Eugene high school talked about changes needed for students to find value in their learning experiences.

The students said:

"I would like to talk more about STEM application to the real world."

"I really like the idea of visiting other schools and seeing what they're like so we can bring back ideas to our school and improve it."

"We need more counselors. A lot of students are struggling at home and school and they need to know they are cared for."

"I would like to talk more about community involvement beyond school."

Computer Science Initiatives

Regional Advisory Board, Coder-in-Residence, Badge Pathways

Program Description

Connected Lane County and Lane STEM are striving to create a comprehensive, unified vision for Computer Science curriculum across Lane County in K-12. Beginning in the fall of 2017, the Regional Advisory Board for all things Computer Science began meeting quarterly. In partnership with the Technology Association of Oregon, industry representatives and educators met to discuss K-12 CS curriculum. Our upper-elementary work began this past winter, when Lane STEM was awarded a Mozilla Gigabit grant that funded the Coder in Residence program. Thirteen different classrooms received a female Coder, a set of Gigabots, and curriculum to learn how to begin coding. Additionally, Connected Lane County developed a badge pathway working with Concentric Sky's Badgr to enable students to show their tech experiences in a way that will ensure that upon completion of the pathway and graduation, they will be guaranteed an interview with a local tech company.

Regional Advisory Board Fast Facts

- 16 school districts
- Lane Community College CS faculty
- University of Oregon CS faculty
- Lane Workforce Partnership
- 8 industry partners

Coder in Residence Fast Facts

- 365 students
- 13 teachers
- 9 female Coders in Residence
- 3 Gigabot "Master" trainers

Coder in Residence Reflections

"I was touched by a thank you from a student I didn't think was getting it."
"I got thank-you cards from each kid in class saying how much they loved coding."
"Everyone was always so happy to see me because the 'robot lady' was there today."

Student Reflections

"Today I learned that Gigabots have battery power. When my robot dies it reminds me of when my phone dies and I hate it."
"Today I learned that you need the internet to move the Gigabot, but I'm still wondering how it connects."

Cottage Grove students recommended to the Computer Science advisory board that they "introduce CS earlier because high school is too late."

7. MID-VALLEY STEM-CTE HUB

Mid-Valley
STEM-CTE HUB

MID-VALLEY STEM-CTE HUB 2017-18

History
The Mid-Valley STEM-CTE Hub is an emerging STEM Hub and serves the communities of Linn and Benton counties in the central Willamette Valley. Its roots are traced back to the *Degree Partnership Program* that began in 1998 when Oregon State University (OSU) and Linn-Benton Community (LBCC) created a program that allowed students to complete their first two years of courses at LBCC and then transfer them seamlessly to a four-year bachelor's degree at OSU primarily in STEM programs such as computer science and engineering. Since that time, the DPP program has been expanded to include supplemental Mechatronics instruction (a field of science that combines mechanical systems using robotics and computers) at LBCC for OSU engineering students.

In 2004, the Mid-Valley Mid-Coast Partnership was created to engage Linn, Benton, and Lincoln county education institutions, share resources, and collaborate on strategies for improving the performance of the region's students and teachers. Since that time, school district superintendents and the presidents of Oregon State University and Linn-Benton Community College began talking about creating a STEM Hub for Linn, Benton, and Lincoln counties. They charted a small committee to work on the concept and its purpose. In 2017 the Lincoln County School District and Oregon Coast Community College aligned with their coastal communities and merged with the Oregon Coast STEM Hub. Linn and Benton counties pursued their own Hub. Linn-Benton Community College became the fiscal agent, partners were identified, and application was submitted to the Oregon Department of Education. The Mid-Valley STEM-CTE Hub was subsequently approved late 2017.

Vision
The Mid-Valley STEM-CTE Hub is overt about its vision of uniting Career and Technical Education and STEM disciplines in a meaningful manner for students. The application of STEM education with CTE career training provides students with a greater understanding of concepts, increases problem-solving and critical thinking skills, sparks interest in course material, and prepares students work, college, or their next steps. Linn-Benton Community College's Career and Technical Education credential programs have a long history of working with area high school Career and Technical Education programs and local employers. Those partnerships laid the groundwork by linking Career and Technical Education technical training with STEM education, as well as the development and focus of the Mid-Valley STEM-CTE Hub.

Activities
Since Oregon Department of Education approval in 2017, our partners hired a full-time director and created a governance Board that is co-chaired by an industry-representative and a school district superintendent. The Board continues to diversify its membership, to refine its strategic plans, and to clarify its value-added roles in the community. Initial thematic core initiatives are: 1) professional development for K-14 teachers, 2) employer and community linkages, 3) outreach, marketing, and advocacy for STEM and CTE career pathways, and 4) data collection, analysis, and improvement.

Mid-Valley
STEM-CTE HUB

Several events and activities are planned between February and September 30, 2019. First, a Mid-Valley STEM-CTE Kick-Off and Symposium is planned for June 25 from 9 am to 1 pm at Linn-Benton Community College. Second, two STEM-CTE Lunch and Learn sessions are planned for K-14 teachers where they will be learn about the Mid-Valley STEM-CTE Hub, applied and/or experiential learning best practices, and how STEM disciplines are used in a real-world, work-place setting. They will also have time to network with their colleagues. Third, we plan to offer a summer professional development workshop for high school teachers in applied physics. The workshop will also include a half-day pre-workshop on the Next Generation Science Standards and a follow-up industry tour for the teachers to see physics applications in an industry setting. Finally, we plan to continue to build a professional learning community (PLC) of teachers for our region. A full-day PLC launch is scheduled for sometime mid-August.

8. NORTHWEST STEM HUB

Northwest STEM Hub 2019 Report

The Northwest STEM Hub is a vibrant partnership with bold aspirations. The NW STEM Hub has been created to:

1. Ensure formal and informal educational experiences are provided to members of the Region's communities, so they will be ready to engage in an economy and culture that is increasingly technological;
2. Invigorate educational opportunity and economic prosperity to benefit both individuals and local communities;
3. Ensure the historically predictable opportunity gap is closed for individuals of color, those who experience economic challenges, and those of rural origins.

These goals were developed over a three-year period, starting with the energetic work of Northwest STEM Partnership, the forerunner of the NW STEM Hub, and culminating over the last year since becoming an official STEM Hub, developing the Partnership Plan, and expanding regional STEM and CTE programming. The goals arise from multiple processes including conducting surveys, listening sessions, and leadership planning meetings and involving entities across four sectors from local industry, P-20 education, non-formal educators, and non-profit organizations. The goals are designed to address the needs of the area served by the NW STEM Hub which include Clatsop, Columbia, and Tillamook counties ("the Region"), and they build on the Region's strengths and assets.

The work of the NW STEM Hub has facilitated and stimulated substantial STEM and CTE opportunities for regional P-20 education. Since its inception, NW STEM Hub efforts brought in more than $1,288,000 in STEM and CTE funding to the Region to carry out its adopted mission, and countless more through in-kind donations. The partners in the NW STEM Hub worked together to create and sustain dozens of opportunities for thousands of students. NW STEM Hub achievements include awareness activities, such as supporting the coordination of Clatsop County's Job and Career Fair; exposure activities, such as coordinating a National Manufacturing Day event with OMIC (Oregon Manufacturing and Innovation Center) in Columbia County; expanding professional development for elementary, STEM, and CTE teachers including participation in the Oregon Science Project and Oregon Fab Lab; leveraging opportunities, such as the negotiation to locate the temporary OMIC training facilities at Scappoose High School; development of real world career exposure with the development of regional paid internship programs for youth; and supporting the development of elementary, middle, and high schools innovative Advanced Manufacturing labs, museum based STEM education, and after school STEM activities. It has provided technical assistance all 13 school districts in the region to modernize and inject high wage/high demand STEM concepts into traditional CTE offerings. This work was accomplished because Northwest STEM Hub has over forty highly engaged, regional partners who are deeply committed to the NW STEM Hub's work.

Data Points:

Our Hub is one of the Emerging STEM Hubs for this biennium and we currently have limited funding for programs, the data below is from the Career Connected Learning, Oregon Community Foundation grant funding:

1. **Clatsop Works**

   The Clatsop WORKS Program was developed to provide local students of the five Clatsop County high schools and Clatsop Community College, ages 16 and up, with exposure to professional, paid internship opportunities in Clatsop County, with the goals of community building, economic development, promoting local career opportunities and retaining local talent. Clatsop Works is in the process being scaled and replicated in Columbia and Tillamook counties.

   Total applicants 2018- 56 ***Total industry partner hosts 2018- 11*** ***Total 2018 interns- 16***

   Total applicants 2019- 90 ***Total industry partner hosts 2019- 35*** ***Total 2019 interns- TBD***

2. **OMIC Professional Development**

   August 2018 was the first OMIC PD session with 20 regional teachers and counselors in attendance from 10 school districts (approximately 665 students impacted). A second workshop on Digital Design and Fabrication was held October 2018 with 27 teachers and administrators, and 3 college and industry representatives from 17 school districts (approximately 1100 students impacted).

   Total educator participants: 47 ***Total students impacted: 1765***

2. **Clatsop Career and Job Fair**

   This effort is led by CEDR/SBDC with support from Worksource, Rescare, and community and education partners (including NW STEM Hub) 6 school districts participating; 650 student attendees; 73 participating employers; Next event March 6th, 2019

   Total students impacted 2018-19: 2780

3. **Career Connected Learning Field Trips**

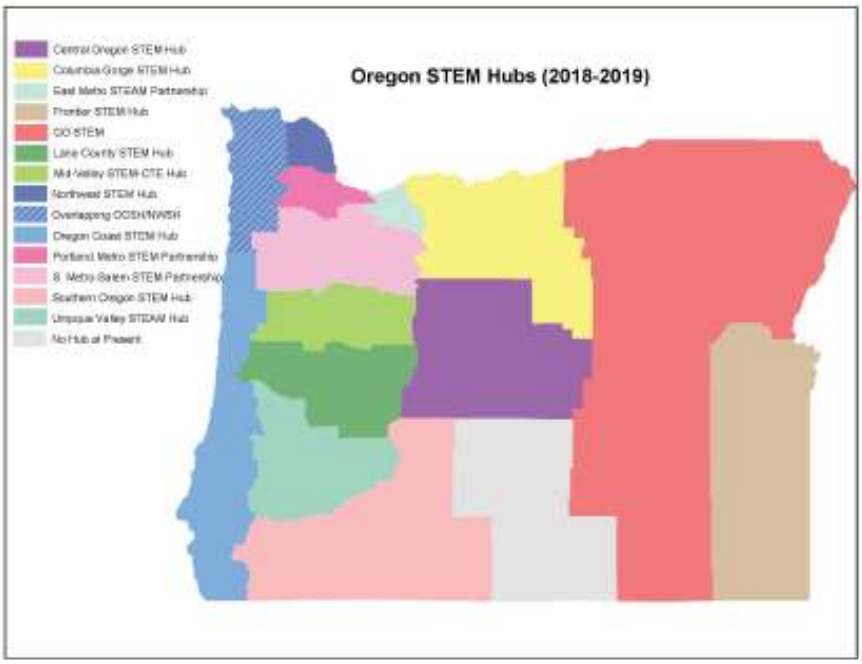
   The application for this opportunity opened in September 2018 and closes November 1st. P-20 Educators interested in a Career Connected Learning opportunity for their students/youth can apply for the 13 available worksite tours. Thus far, the applications include career expos, exposure to local industries, apprenticeship programs, community colleges, and universities.

   Total CCL Field Trips 2018-19: 13

   Educators Impacted: 26 ***Students impacted: 260***

9. OREGON COAST STEM HUB

WHO WE ARE



Oregon Coast STEM Hub (OCSH)

Headquartered at the Hatfield Marine Science Center in Newport, Oregon the OCSH serves coastal educators, youth and rural communities located along the Oregon Coast, from Brookings up to Astoria. This distinctive landscape provides a unique opportunity for place-based learning focused on coastal ecosystems, ocean health, marine science and technologies, and career-connected learning for the maritime sector. The OCSH also supports a wide array of STEM teacher professional development and student STEM experiences outside of marine science, but our location along the ocean is a resource unique to the hub. The OCSH collaborates with more than 60 partners including 21 school districts, 6 post-secondary education institutions, 13 community organizations, 7 businesses, 6 government agencies, 5 centers, one regional achievement collaborative, and one Confederated Tribe.

VISION

Fostering a culture of STEM innovation by engaging people of all ages to create a vibrant and prosperous region.

MISSION

The Oregon Coast STEM Hub engages learners with STEM by leveraging local and regional resources and collaborating with diverse partners.

STEM Teacher Professional Development

Community Partnerships

Student STEM Experiences

OUTCOMES

- 11,298 direct contact hours of student STEM experiences for 1,123 students.
- 1,742 teacher professional development direct contact hours for 254 teachers; 323 teachers borrowed STEM equipment for use with 24,300 students.
- 124 STEM business and industry volunteers contributed 1,080 hours to support student STEM experiences.

THE COLUMBIA PRESS

Ocean research and cruise part of lesson plan

This experience was one of the most rewarding and impactful of my teaching career. Looking at data is not the same thing as collecting it, and I've learved so much about what goes into obtaining marine data.

The MATE ROV program] is one of the best most affordable STEM projects of its kind and the skills that students learn throughout the entire process, from the design phase to the competition, are unmatched.

Taking the Picture Perfect STEM course helped me a lot to understand the NGSS, how to incorporate the 5 E's into a lesson, and how easy it is to include literacy in STEM. I see myself including other teachers in my school on how great Picture Perfect is and help them to implement it into their classrooms with the end goal of having more teachers teaching STEM.

10. PORTLAND METRO STEM PARTNERSHIP

Portland Metro STEM Partnership
650 NW 118th Avenue
Portland, OR 97229
info@pdxstem.org

OVERVIEW

Portland Metro STEM Partnership (PMSP) is a regional collaboration of public and private organizations with a shared goal of transforming science, technology, engineering, and mathematics (STEM) education for K-20 students. Launched in 2011 as a Collective Impact initiative, PMSP was the precursor for the Oregon STEM Hubs and continues to be a leader within the STEM Hub network. We are one of 13 STE(A)M Hubs across Oregon (STEAM hubs incorporate arts learning into the other four core STEM subjects). We believe that high quality STEM education is critical for not only preparing our youth for a STEM-based economy but for developing a STEM literate society able to fully participate in our democracy. PMSP supports the creation of world-class STEM learning environments that are captivating and relevant for ALL students, regardless of background or zip code. PMSP's primary geographic area is defined by the boundaries of our five school district partners: Portland Public, Beaverton, Hillsboro, Forest Grove, and Banks. Our actual region extends beyond these boundaries as we engage community-based organizations, business/industry and other partners outside these school district boundaries.

CORE INITIATIVES

PMSP supports the creation of world-class STEM learning environments that are captivating and relevant for ALL students, regardless of background. We work with education, industry, government, and community partners in the following core areas:

- Provide access to effective professional development: All types of educators need high- quality professional development that addresses both STEM instruction and assessment.
- Facilitate STEM school transformation: Schools need the resources and support to become STEM- focused
- Develop in-school/out-of-school partnerships: Students deserve expanded STEM learning opportunities. Community-based organizations have access to networking, technical assistance, professional development, and other resources through our STEM network for community educators, the Collaboratory.
- Cultivate career-connected learning: Students and educators benefit from encounters with real-world content and experiences to understand how STEM courses and careers are intertwined.
- Support STEM educators' use of evidence: Educators want to know what's working and what isn't when it comes to creating strong learning environments for all youth.

PMSP addresses these endeavors collectively, resulting in greater impact, by:

- Connecting and convening educators, businesses, professionals, and community programs to work together toward shared STEM education goals with larger effect.
- Identifying resources and relationships across the region, leveraging the strengths and assets of

partners to improve outcomes while reducing duplication of efforts and maximizing effectiveness.

- Designing and implementing STEM programming for youth in multi-partner projects.
- Providing tools, sharing proven methods, and offering consultations to strengthen our partners and bridge the gap between research and practice to improve STEM learning for all youth.

EXAMPLE ACTIVITIES

Our **annual STEMposium ½-day event** brings together up to 200 stakeholders, partners, and interested individuals to highlight regional successes and explore issues and challenges in STEM education. Designed as both a networking and learning opportunity, this year's event explores the challenges faced when ALL students can't see pathways to becoming engineers, technologists, scientists, and researchers. Join us on April 26 at Intel!

For additional examples, such as our ***High School Science for All regional curriculum*** and the ***Summer STEM Program for Middle School Students*** (serving predominantly migrant youth), and a **snapshot of impacts**, please see our PMSP Snapshot here: http://bit.ly/PMSP_Snapshot

IMPACTS THIS BIENNIUM

Impact Area	Value
Number of educators who participated in Hub PD or programs	900 educators
Number of educator hours spent in Hub PD and programs	12,175.5 educator hours
Project number of students impacted by educator PD participation	79,039 students impacted
Number of industry volunteers who participated in Hub activities	279 industry volunteers
Number of industry volunteer hours	560.5 volunteer hours
Number of students who participated in Hub support programs	3,134 students
Number of student hours in Hub support programs	20,616 student hours
Estimate of students who benefit from equipment loaning programs	3,250 students
Estimate of teachers who benefit from equipment loaning programs	26 teachers

PMSP Leveraged Funds (non-state funds):	Value
Grants and sponsorships (2017-2019)	$355,706
Partner investments in Hub initiatives (2017-2019)	$1,150,600
In-kind time and resources (2017-2019)	$303,709
Funding secured during this biennium for the future (2019-2023)	$915,021
Total	**$2,725,036**

11.SOUTHERN OREGON STEAM HUB

Southern Oregon STEAM Hub 2017-19

Background

The Southern Oregon STEAM Hub has the overall purpose of using a collective impact approach to help all Oregonians graduate from high school and attain some level of post-secondary education that will prepare them for success in college or on a career path leading to high wage, high demand jobs.

Southern Oregon STEAM Hub's mission is to infuse STEAM (Science, Technology, Engineering, Arts, and Mathematics) into every classroom and beyond. STEAM is both a reference to courses and academic disciplines and a "way of thinking" or a "way of being" in the classroom. Scientific inquiry, creativity and innovation, computational thinking, project-based learning, and collaborative problem solving are the hallmarks of the 21st century workplace and SOESD schools. These skills, along with core relationship competencies and mindsets, will drive the outcomes necessary for our region to thrive and bring economic prosperity to all!

The Hub serves formal and informal educational organizations in Josephine, Jackson, and Klamath counties, and includes 13 school districts with 8 percent of the state's school-aged population.

Core strategies and Initiatives

Overarching all the strategies and Initiatives below, and a core strategy in and of itself is to increase the diversity of those participating in STEAM Hub activities. Specifically, our focus is to increase the number of underserved and non-traditional educators and students who have access to and persist in STEAM Hub opportunities.

1. **Educator Professional Development**

Key among our STEAM Hub strategies is to increase educator access to high quality STEAM related professional development. This includes PD that increases efficacy with applied, project based learning strategies, as well as that which increases educator understanding of, and experience with, ways in which STEAM content manifests in STEAM fields. Since September 2017, we have supported world-class training delivered by renowned Buck Institute of Education for 54 of our educators (seven of whom are educators from within our partner agencies) throughout our three county region.

2. **Youth Voice Initiative**

In late 2016, Southern Oregon STEAM Hub collaborated with the Arizona based Chief Science Officer program (CSO) – to launch first of its kind in Oregon. CSO students become ambassadors helping adult decision makers in education and industry to better understand the needs of diverse students in the region. The Youth Voice initiative leverages student voices to promote STEAM activities, events, and opportunities to their peers. Currently we have 12 high schools in the region with CSO clubs implementing their STEAM awareness strategic plans. STEAM Hub staff support CSOs in conducting focus groups with historically underserved populations to find out what methods, activities, people,

and conditions are most likely to recruit, retain, and support their participation, persistence, and success in our STEAM opportunities and along STEAM pathways.

3. **Partnerships**

Partnerships and collaboration are a vital component of sustainable programming and efforts to maximize impact and outcomes. To that end, Southern Oregon STEAM Hub has committed to moving beyond informal partnerships with our some of our afterschool and summer camp partners like Boys and Girls Clubs, Siskiyou Field Institute's Outdoor Schools, and the local Maker Spaces. To date, we have five formal Memorandum of Understandings signed by CEOs of our respective agencies and are currently working on others. Maintaining all our partnerships is a priority and the SOESD currently lists over 40 active industry, business, community, and government agencies with whom we are robustly collaborating on STEAM events, activities, and opportunities for educators, students and their families.

4. **Data-driven Decision Making**

Southern Oregon STEAM Hub has contracted with both Education Northwest and Willamette Education Service District to help with major data gathering and analysis. Our goal is to help our governance committee grasp more clearly who among our students are accessing accelerated learning opportunities and in which areas, whether we are hitting our equity targets, how students are responding to summer and afterschool camp offerings, etc. Researchers are supporting us in developing a universal evaluation plan that will identify common and unique data elements across each of our various grant projects, develop appropriate evaluation instruments for project outcomes with no readily available data elements, and collaborate with project staff to develop reports as well as appropriate Infobriefs for our marketing and communicating with stakeholders and community.

Anyone interested in our 2017-19 outcome data and other recently compiled reports may e-mail debbie_vought@soesd.k12.or.us .

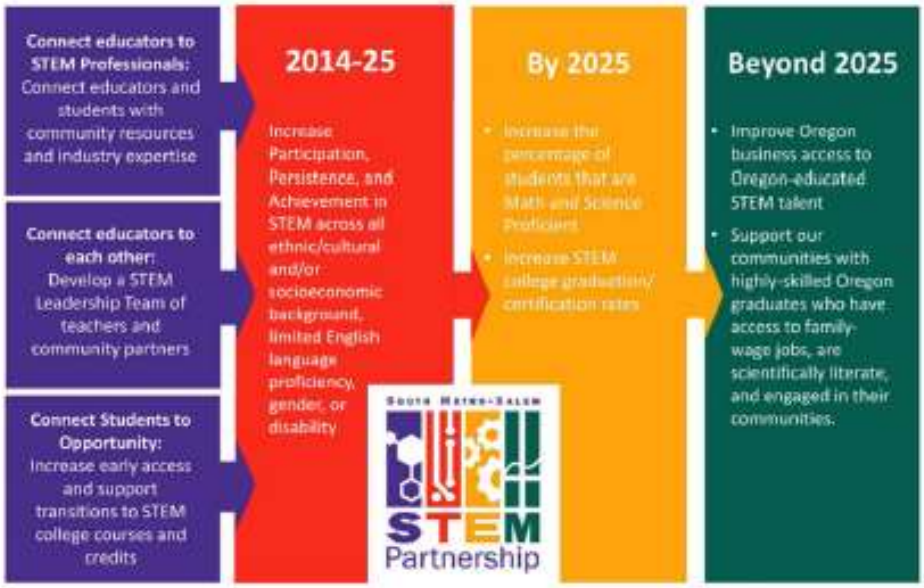
Major events/projects you would like to highlight

1. **Southern Oregon STEAM Hub Lending Library**

The library is southern Oregon's home for experiential, hands-on, project-based, STEAM (Science, Technology, Engineering, Arts, and Math) learning equipment, tools, and activities. Educators in our component districts and our education partners can access the library free of charge. Teachers wanting to create relevant, stimulating STEAM experiences for their students, and teachers with a passion for robotics, 3D printing, laser engraving, coding, science, engineering, aviation, will find an ever-expanding treasure trove of lessons, learning tools and equipment. Our Library's "outreach and project liaison" also schedules professional development opportunities (from one-hour to all day) for teachers who need more support getting comfortable with 21st century technology tools and toys.

12.SOUTH METRO-SALEM STEM PARTNERSHIP

The South Metro-Salem STEM Partnership (SMSP) is a collaborative of community leaders, representing 16 K-12 school districts, 6 higher education institutions, and more than two dozen industry, civic, non-profit, and community organizations, with the vision to catalyze Oregon students to achieve STEM degrees and certificates, and reach Oregon's education goals by increasing the access, excitement and engagement of students in STEM courses and experiential learning. Since 2012, we have leveraged more than $3M of external funding, in addition to state funds, for projects to advance our STEM goals among and in support of our partnering organizations. We seek to achieve these goals by focusing our efforts on activities and objectives that support three core strategy areas that represent the assets, needs, and opportunities in our region, with particular emphasis on strategies that have potential for scalability and/or transferability within the STEM Oregon regional hub network.



The SMSP region is comprised of the suburban and rural areas south and southeast of Portland, continuing through rural regions surrounding the I-5 corridor extending into the urban community of Salem. The 16 partnering school districts serve over 125,000 students, or about 25% of the state's K-12 students. While our partners acknowledge that our region is rich in STEM resources, there has not historically been cross-district or cross-sector collaboration to tap these resources in a coordinated, systemic, equitable manner. Localized economic and geographic disparities have largely determined which students could access high quality STEM educational resources. Local employers are unable to fill open, well-paying STEM jobs with students from their community, all of which are increasingly ethnically and racially diverse. *Systemic coordination of efforts, collection of data, encouragement of new partnerships, and initiation of new opportunities to acquire resources are needed. The hub backbone enables such cross-sector collaboration across our three core strategies to ensure that best practices and valuable resources are shared among educators, across sectors, and between partner institutions for the good of all students in our region, our workforce, and our communities.*

Since 2012, the SMSP partners have engaged in a number of activities and initiatives related to the main core strategies that have resulted in demonstrable change to the regional STEM education landscape (Key initiatives bolded).

1. Connect educators and students with community resources and industry

   Key Achievements:

   - Established (and continue to maintain) STEMOregon.org as a central shared asset for STEM education in Oregon.
   - **Developed and piloted Oregon Connections, powered by Nepris, an online platform facilitating in-person and real-time virtual skills-based matching between educator requests for skills/expertise with STEM industry volunteers.** More than 800 Oregon industry professionals and 1600 educators (statewide) join a national network of 40,000 professionals. >1800 educators have provided industry experiences to >15,000 Oregon students to date.
   - Led effort to garner cross-agency (HECC, ODE), philanthropic, and corporate support to expand Oregon Connections licensure to teachers statewide and upport training and usage; continue to lead expansion efforts through regional STEM Hub partners.
   - Established model for locally relevant regional STEM Educator Tours of local industry sites for teaches and district administrators, coupled with curriculum-aligned career-relevant classroom activities.
   - Collaborated with regional partners to pilot STEM Elementary Administrator Leadership Academy for elementary school principals, and to expand regional Math in Real Life opportunities for SMSP math teachers.
   - Piloted model for district engagement to develop K-12 Computer Science Implementation Plans.

2. Connect educators to each other.

   Key Achievements:

   - **Established STEM Leadership Team of >150 regional teachers and community partners to identify, develop, and share best STEM instructional practice.**
   - Led development of STEM Implementation Plans in 16 partnering school districts.
   - Established SMSP STEM Attributes Framework, detailing shared vision for high quality, interdisciplinary, equitable, career-connected STEM teaching.
   - Established professional development and support structures for teacher-leaders to establish and nurture STEM cultures and priorities within partnering school districts.
   - Leveraged $300 NASA funding over 5 years to develop and deliver standards-based NASA-related STEM professional development to >120 middle school teachers.
   - Provide ongoing leadership opportunities to STEM Leadership Team members to create, develop, and lead district and partnership STEM initiatives; SLT members are consistently promoted to district leadership roles as Team Leads, Instructional Facilitators/Coaches, Teachers on Special Assignment, and Administrators.

3. Connect students to post-secondary opportunity.

   Key Achievements:

   - Delivered > 40 new sections of STEM dual credit courses in first biennium (2013-15).
   - **Increased enrollment in STEM Accelerated Credit (AP, IB, Dual Credit) by 2% from 2014-15 to 2015-16 (most recent data available).**
   - Increased enrollment in high school STEM/CTE electives by 13% overall (22% Hispanic/Latino, 17% English Language Learners, 16% free/reduced lunch).
   - Developed award-winning (2015 National Alliance of Concurrent Enrollment Partnerships) marketing and outreach materials to promote Accelerated Credit; co-developed Accelerated Credit Resource Dashboard for high school counselors with Oregon College Career Collaborative (C3).

13.UMPQUA VALLEY STEM HUB

Umpqua Valley STEAM
Explore • Experience • Empower

Report to Oregon STEM Investment Council

January, 2019

Mission: To support and provide inspiring, engaging authentic STEAM learning experiences for youth in Douglas County preparing them for future careers and a meaningful future.

Example of Major Initiative

As part of the Bright Futures Umpqua Initiative (expanding STEAM Career Connected Learning experiences for students) the UVSH has led the planning and delivery of middle school summer camps promoting STEAM careers and linked to local high school CTE programs. **144 middle school youth from across Douglas County participated in week long Expanding Horizons camps in 2018** focused on manufacturing and technology, drafting and production, business entrepreneurship, the Trades and Natural Resources. 8 total camp weeks were offered. 266 students participated in 2016 and 2017. 60% represent underserved populations. Camp offerings will be expanded this summer to include healthcare careers. Students participate in projects and activities led by trained staff and representatives from business and industry. When possible, tours to industry sites are included. Partners include Umpqua Community College, the Douglas ESD, the National Guard, Wolf Creek Job Corps, DR Johnson Lumber Company, ORENCO Systems, Inc., and local school districts.

Key DATA Points

Improve the quality of STEAM learning experiences PreK-12 both in- and out-of school. (SEP Goal 1 and 3)

- **129 unduplicated educators representing all districts and 86% of all buildings** have participated in a variety of professional development experiences in 2108-19 including NGSS, Project-based/place based learning, Oregon Connections, and our week long STEAM summer institute. Follow-up support is provided through regular visits to buildings and professional learning communities meeting throughout the year. Educators are provided ongoing support to be STEAM champions in their various learning environments. At least 1120 hours have been logged in 2018-19 with an estimated impact on 3050 students.
- **16 elementary and middle school champions representing 8 of 13 districts** are being supported through a Professional Learning Community model to develop shared resources for delivery of quality STEAM education in rural environments.

- **131 educators are registered users of the Resource Lending Library** providing tools to support quality STEAM learning. Lesson and unit plans using library equipment are being written by STEAM champions to be available through Oregon Ed Net. Quality lesson attributes have been adopted and are used to evaluate quality. It is estimated that at least 4450 students have been impacted by lending library resources.
- **Brightworks Clubs** are being initiated in high school school environments as a launching pad for exploring STEAM careers, developing future plans and platform for expressing youth voice. A summer camp will focus on growing leadership skills. Topics include a focus on Healthcare, Manufacturing, Engineering, Natural Resources and the Trades (local priority sectors).
- Primary **out-of-school partners delivering STEAM learning opportunities** throughout the year with regular partnership from Hub staff include the YMCA of Roseburg and South County, the Boys & Girls Club of the Umpqua Valley, Alder Creek Community Forest, Umpqua Community College, FIRST Robotics teams (17 FTC and 11 FLL teams), and the 10 libraries of our county (newest venture).
- At least 439 students have participated in Hub supported programs in 2018-19 for a total of 12,544 contact hours.

Expand opportunities for family and community engagement in STEAM learning experiences. (SEP Goals 1 and 3)

- The **2018 STEAM Extravaganza brought over 500 participants of all ages and 45 community partners** together to experience a variety STEAM activities from building a pipe organ, designing and creating various structures, experimenting with drones, robotics and GIS technology and exploring various CTE and STEAM courses of study at UCC.
- **Family Engineering Nights and Science Exhibitions have occurred in over 50% of our elementary schools** supported by resources in the Resource Lending Library.
- Activities of the Hub and its partners have a regular media presence including TV, radio, printed materials and social media.

Increase number of students engaged in STEAM career connected learning experiences through awareness, exploration and preparation with support for future planning including post secondary education. (SEP Goals 1,2 and 3)

- **Five school districts and one non-profit** are engaged in the initiative **BRIGHT FUTURES UMPQUA** to build stronger connections to local business and industry through industry tours and mentorships, career fairs, job shadows and internships. Current focus is at middle and high school with potential impact on 2700 students. Project will be expanding to all county school districts in 2019-20.
- **35 educators (including 6 out-of-school and home-school co-op partners) currently hold virtual licenses for Oregon Connections** with 15 sessions completed to date and several scheduled through December. All districts are represented. 1 school district with more pending are engaging as a cohort for PD

APPENDIX B:

4TH GRADE MATH PROFICIENCY[20]

Chart 12

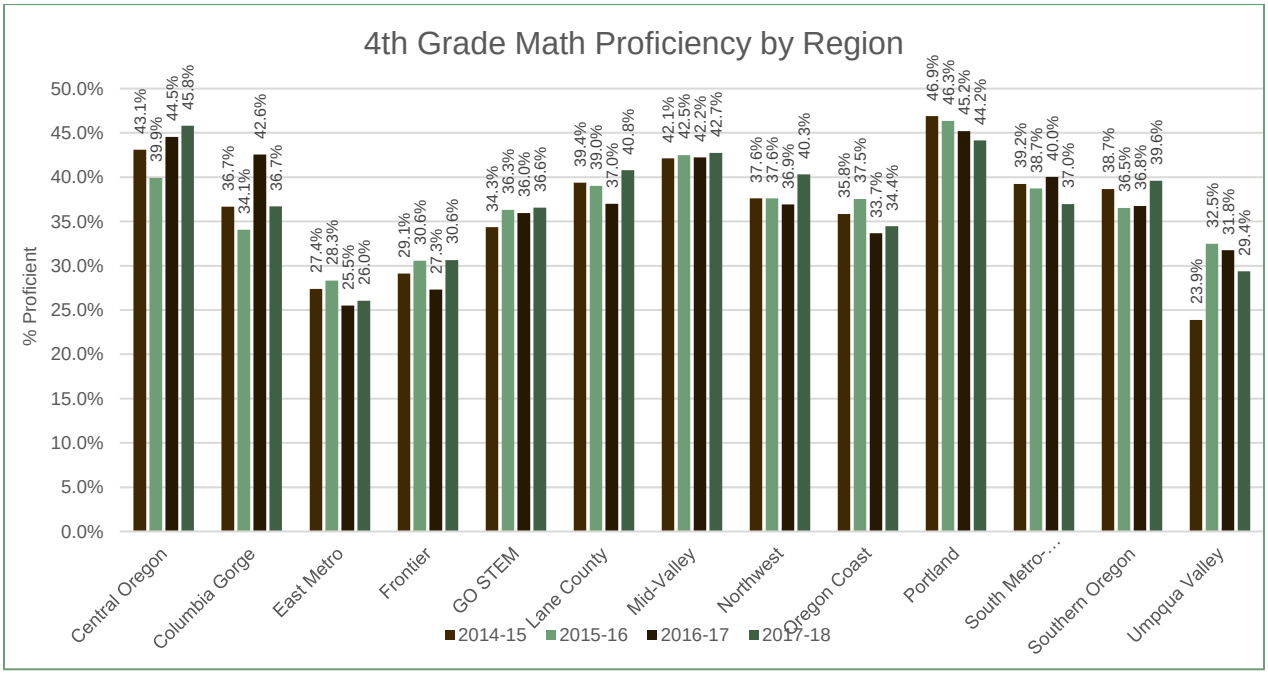
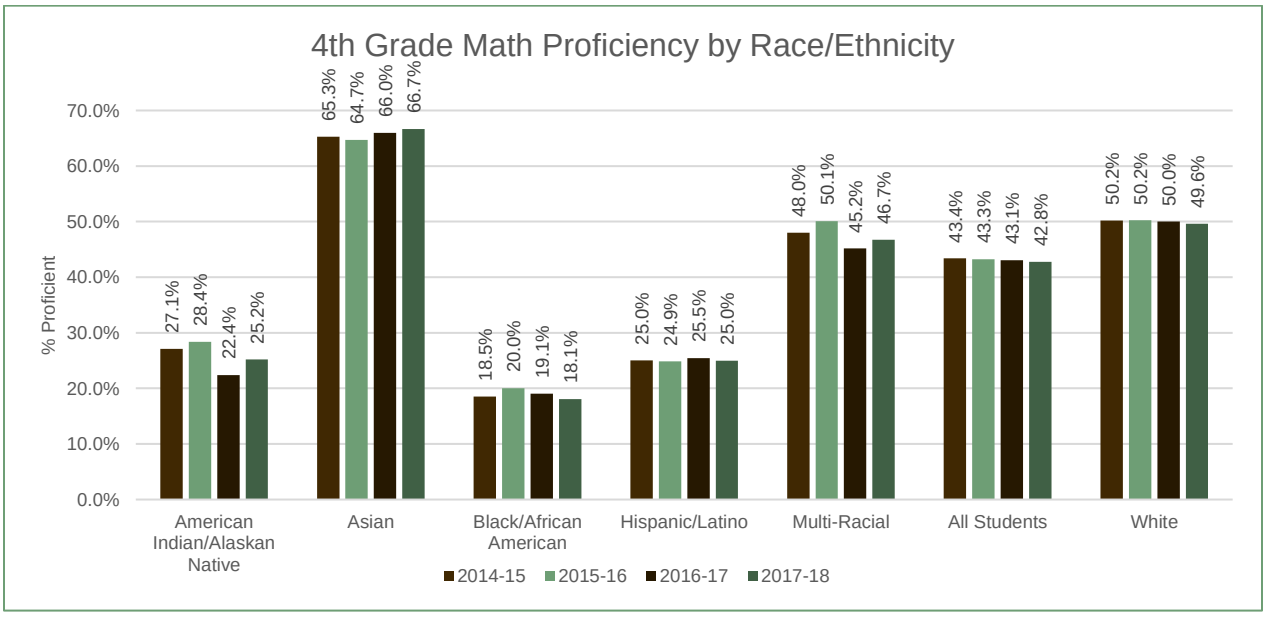


Chart 13



[20] Oregon Department of Education, https://www.oregon.gov/ode/educator-resources/assessment/Pages/Assessment-Group-Reports.aspx

Chart 14

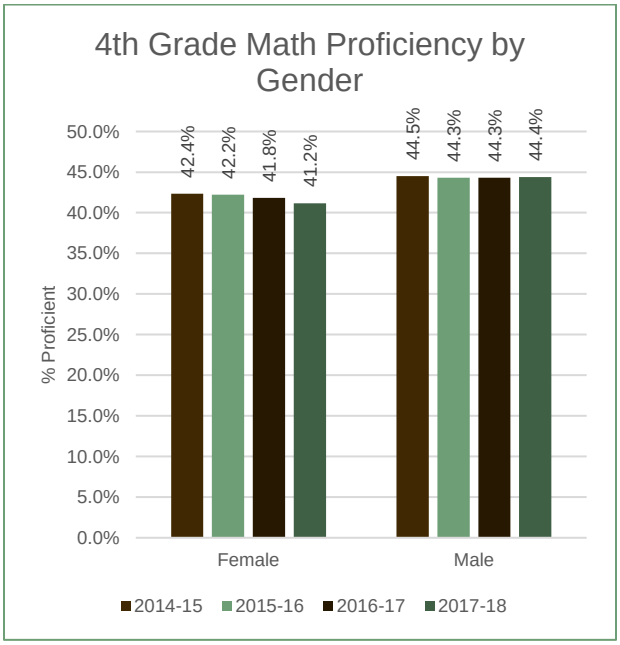
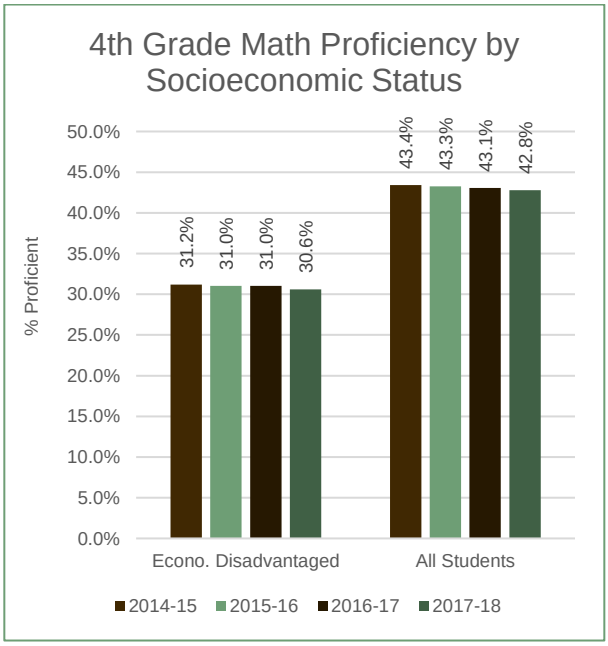
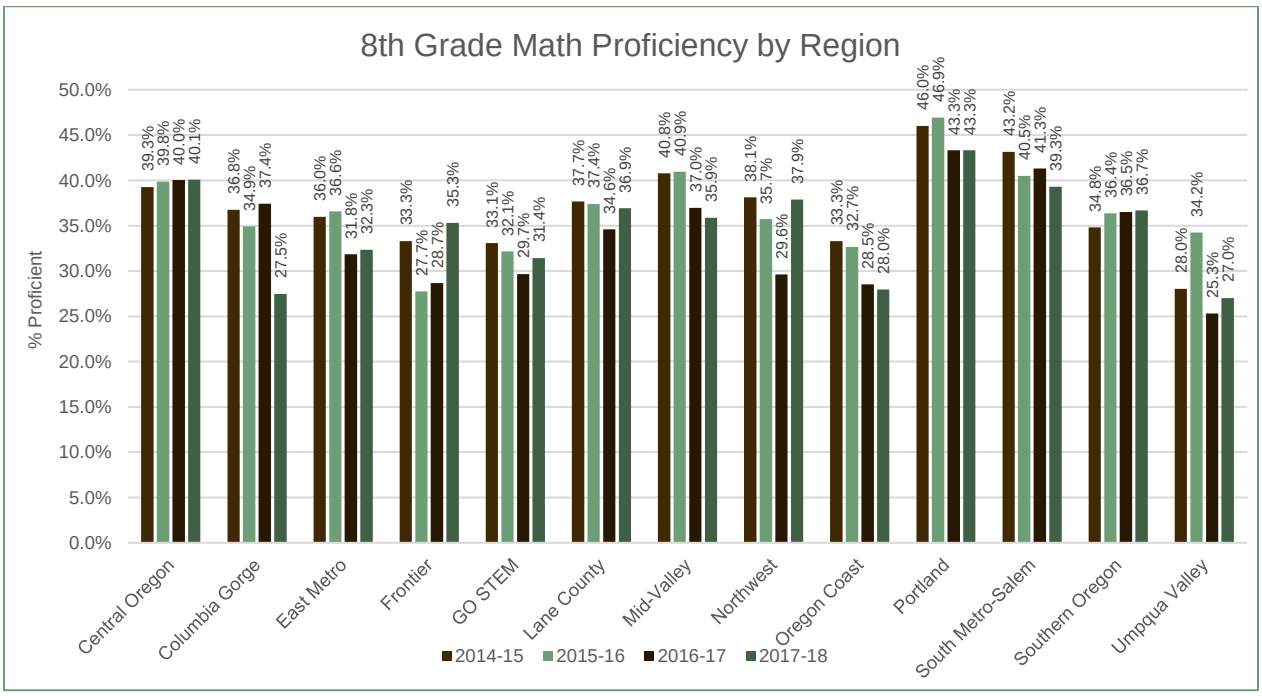


Chart 15



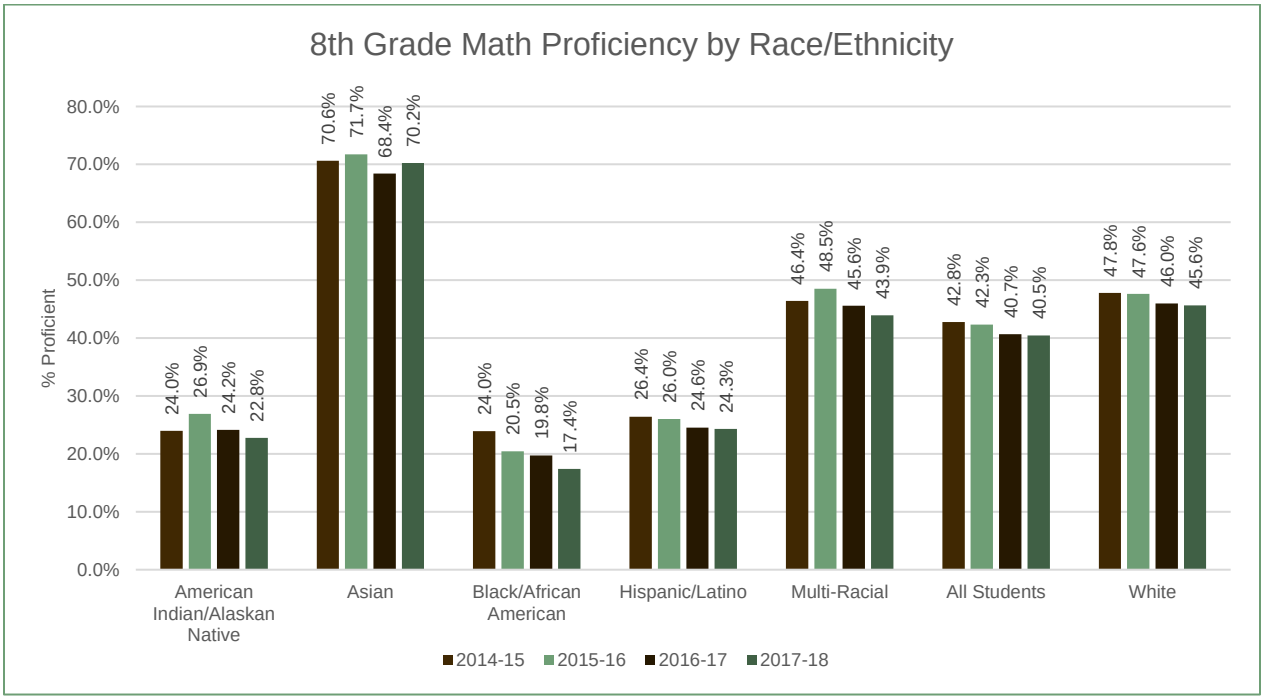
8TH GRADE MATH PROFICIENCY[21]

Chart 16



[21] Oregon Department of Education, https://www.oregon.gov/ode/educator-resources/assessment/Pages/Assessment-Group-Reports.aspx

Chart 17



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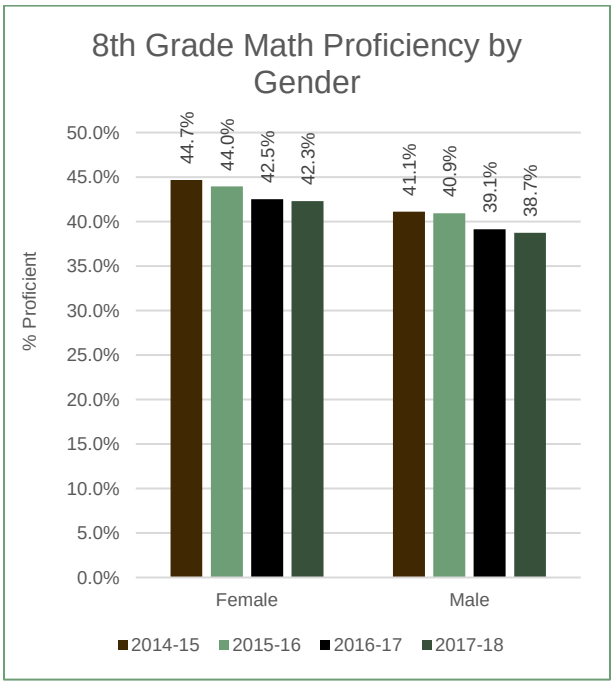
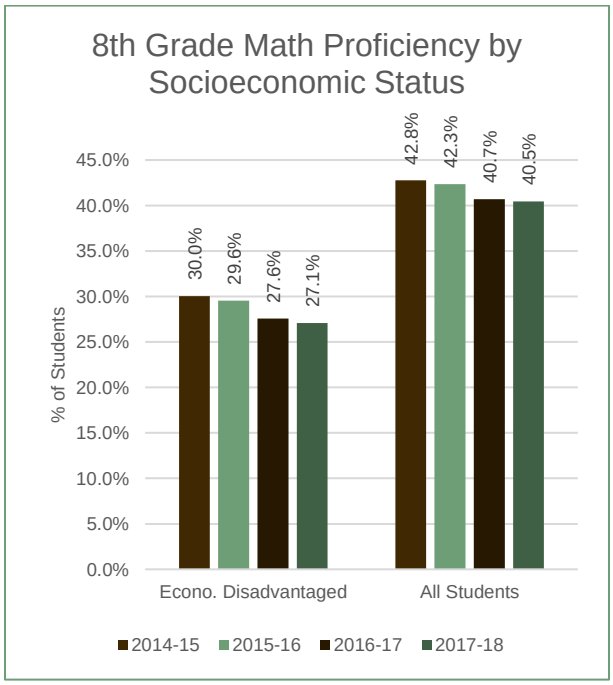


Chart 19



5TH GRADE SCIENCE PROFICIENCY[22]

Chart 20

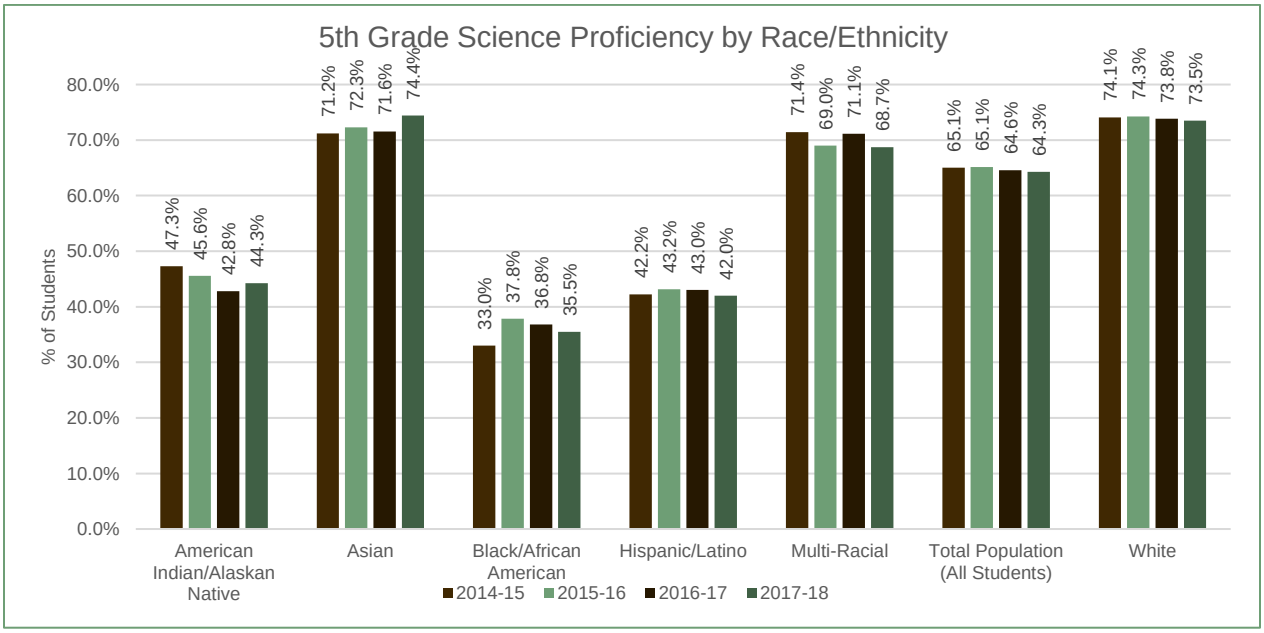
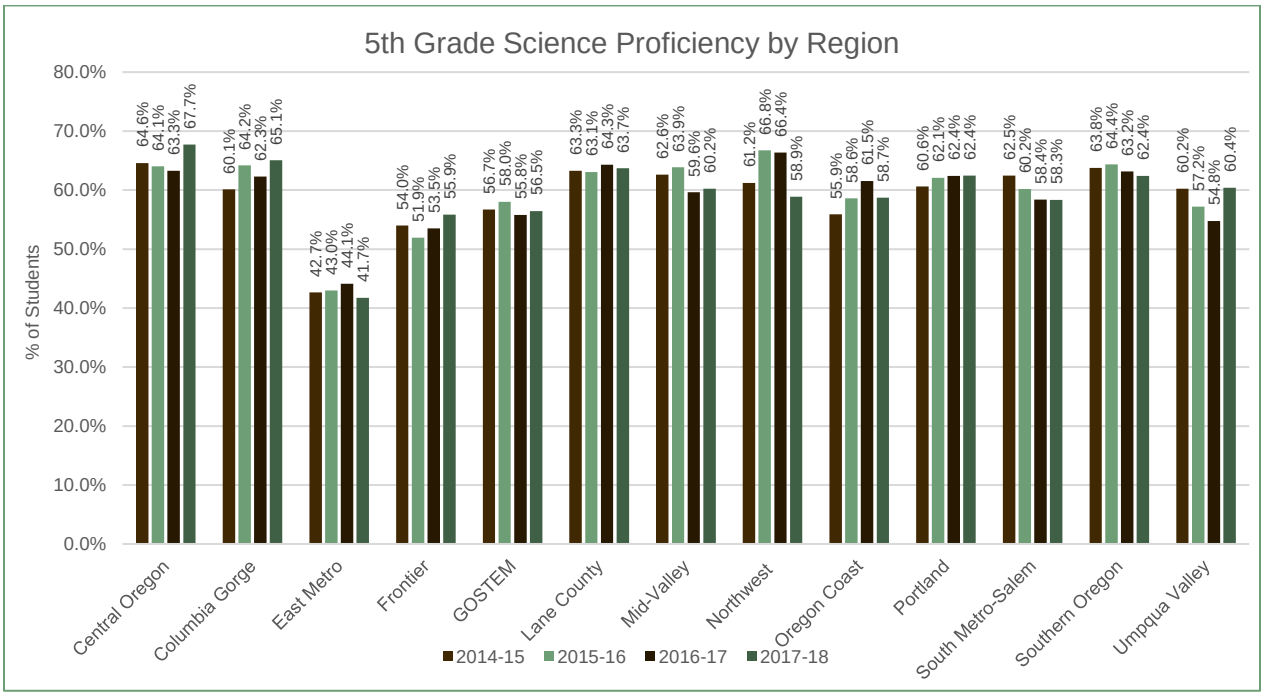


Chart 21



[22] Oregon Department of Education, https://www.oregon.gov/ode/educator-resources/assessment/Pages/Assessment-Group-Reports.aspx

Chart 22

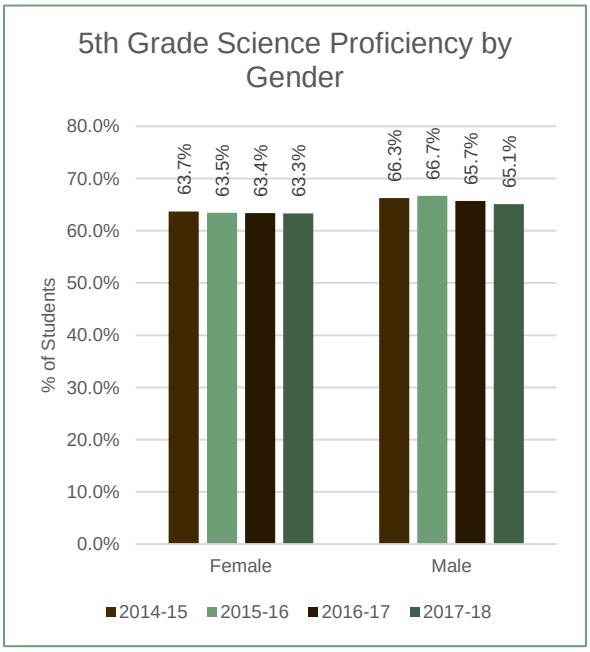
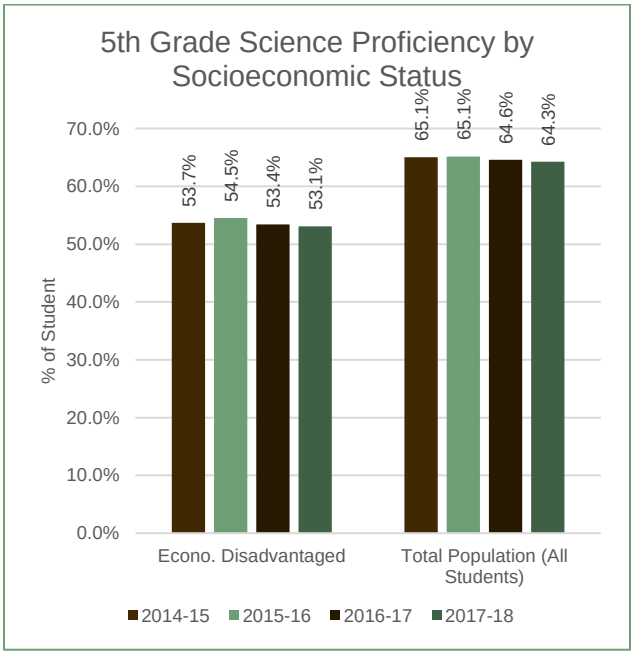
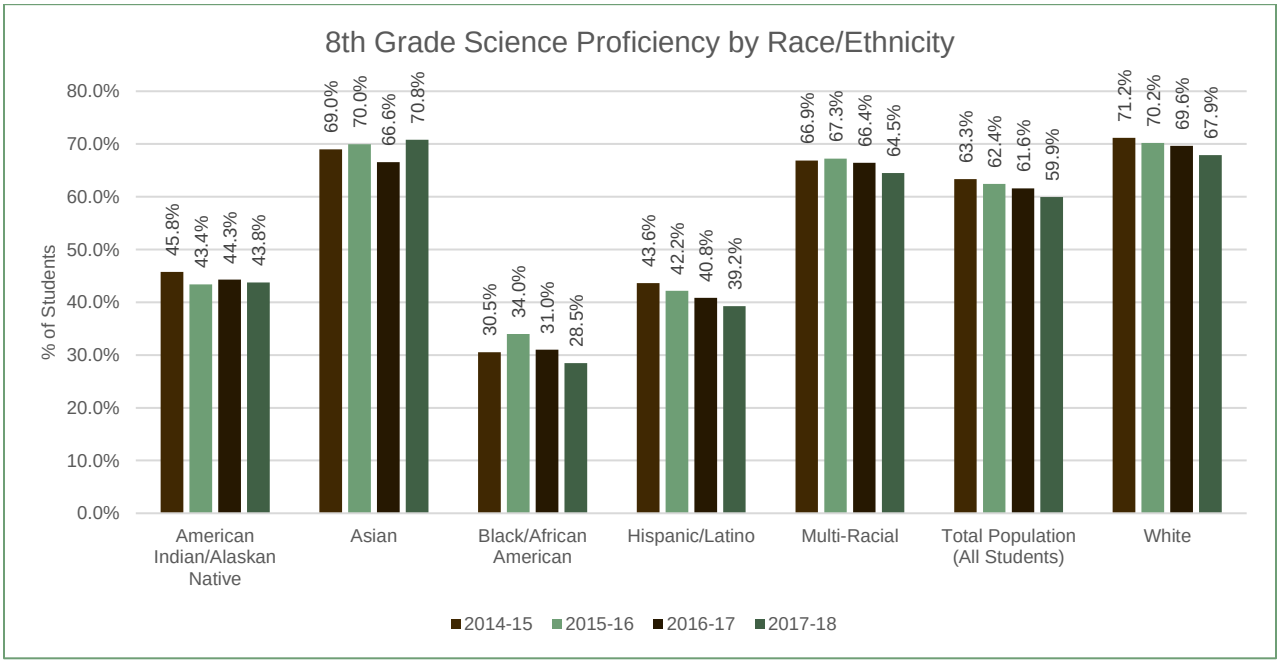


Chart 23



8TH GRADE SCIENCE PROFICIENCY[23]

Chart 24



[23] Oregon Department of Education, https://www.oregon.gov/ode/educator-resources/assessment/Pages/Assessment-Group-Reports.aspx

Chart 25

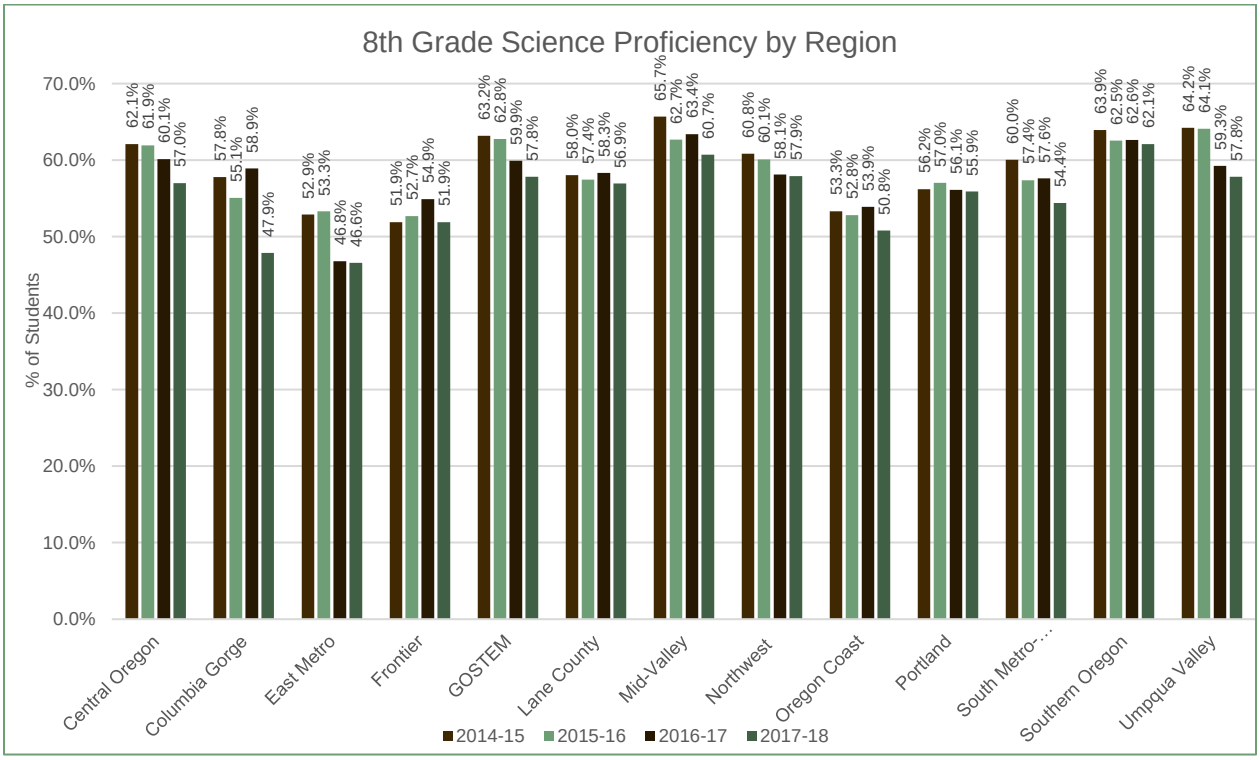


Chart 26

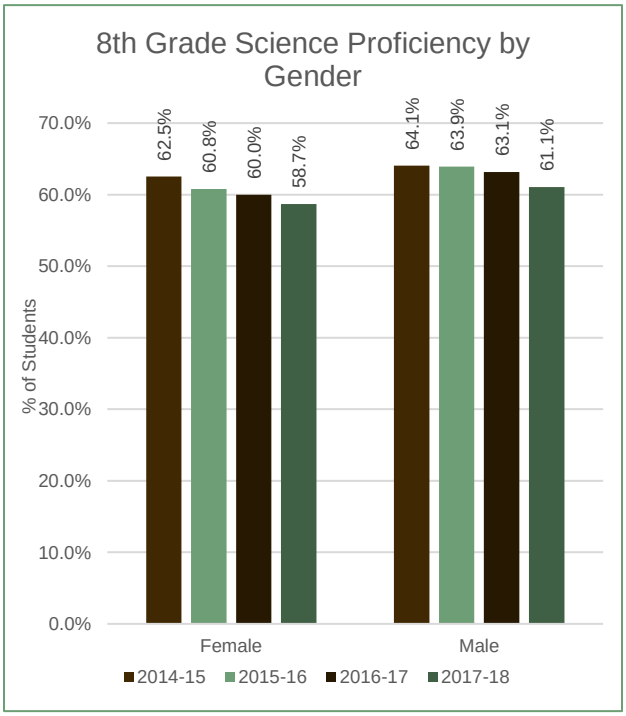
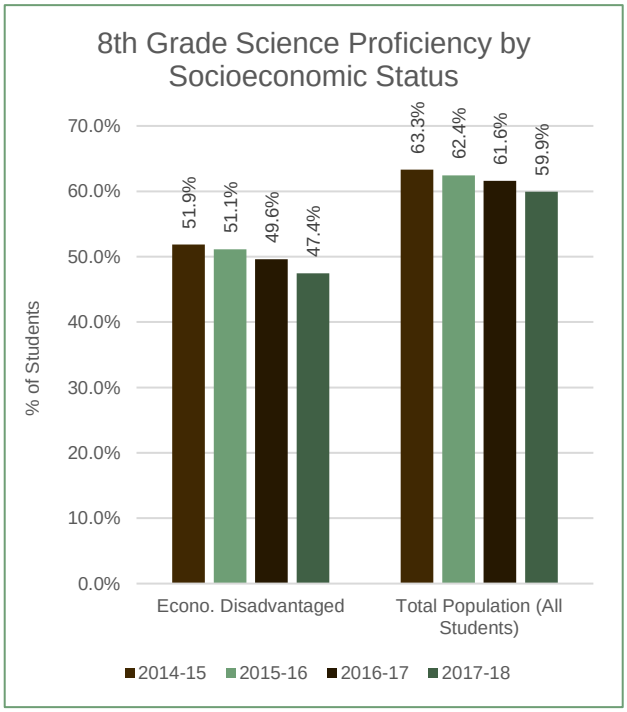
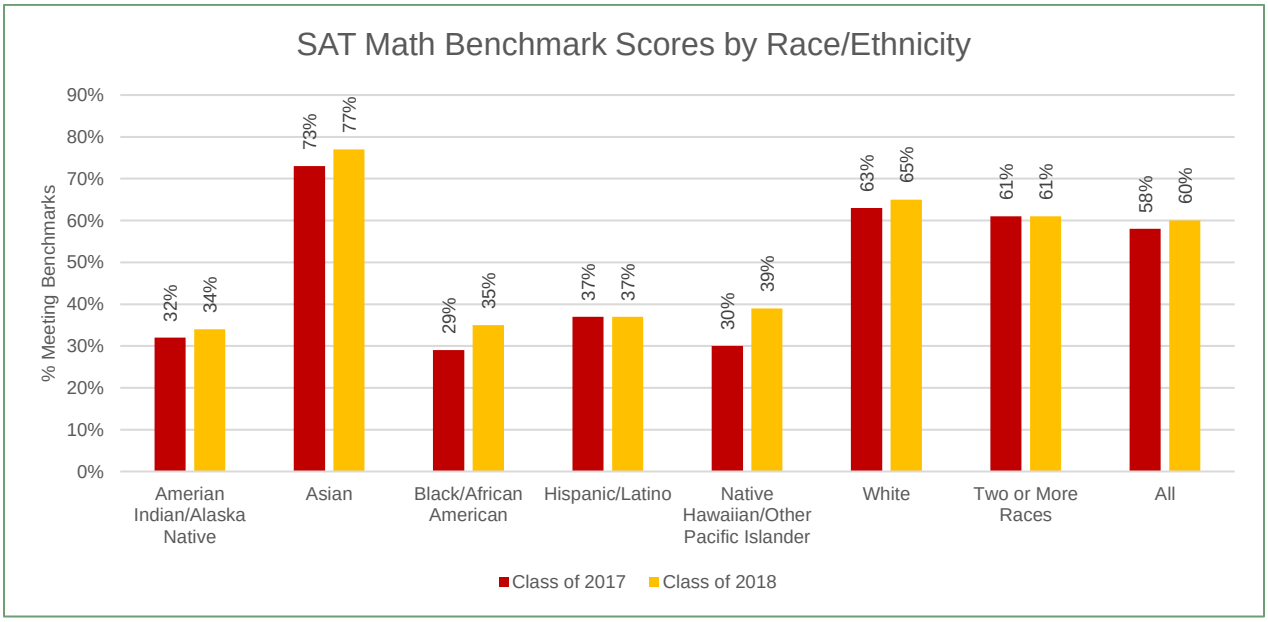


Chart 27



PERFORMANCE ON AP[24], ACT[25], AND SAT STEM TESTS[26]

Chart 28



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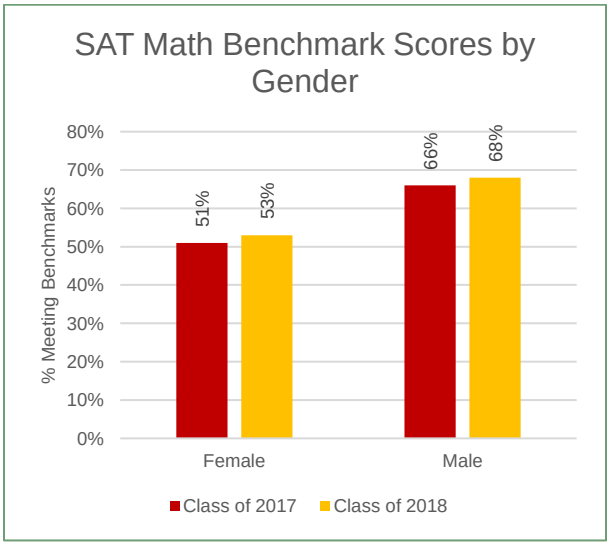
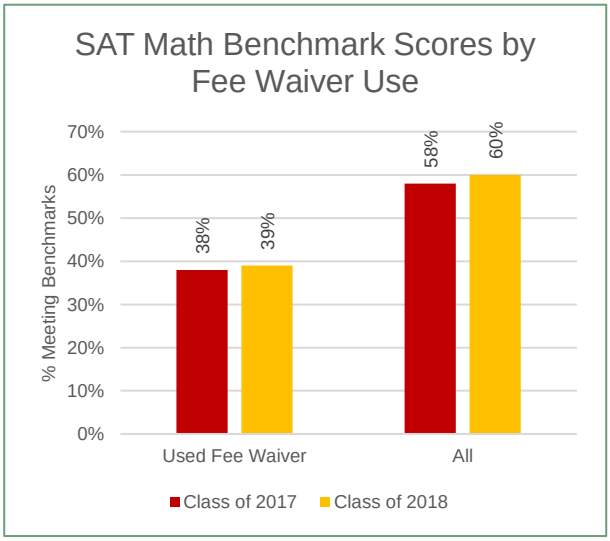


Chart 30



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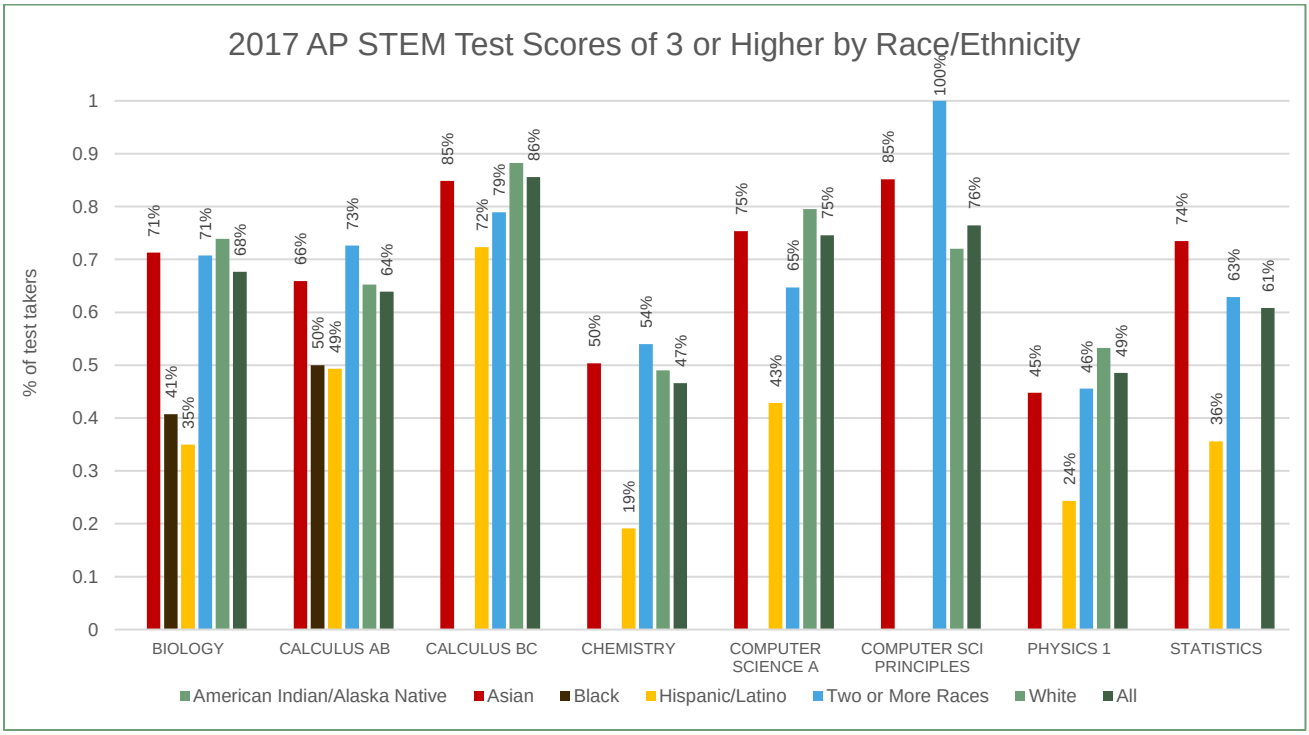
[24] College Board, https://secure-media.collegeboard.org/digitalServices/misc/ap/oregon-summary-2017.xlsx and https://secure-media.collegeboard.org/digitalServices/misc/ap/oregon-summary-2018.xlsx

[25] http://www.act.org/content/dam/act/unsecured/documents/STEM2016_38_Oregon.pdf

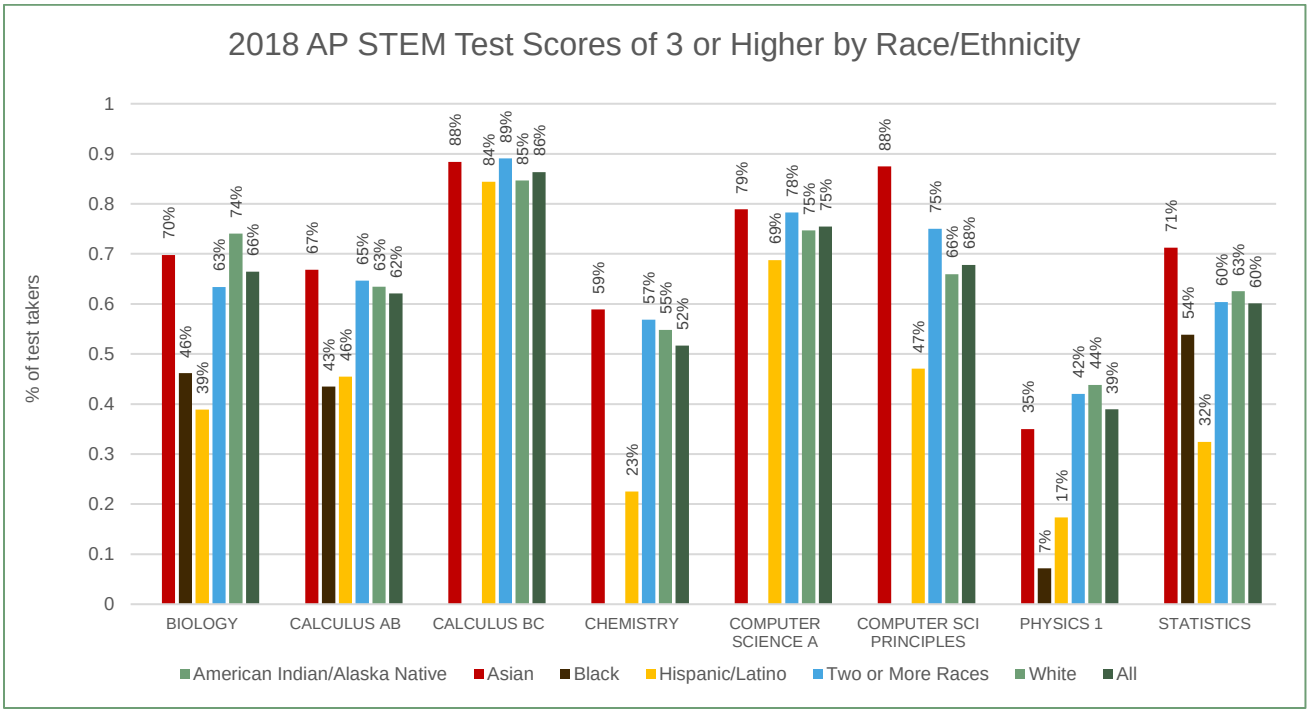
[26] College Board, https://reports.collegeboard.org/pdf/2017-oregon-sat-suite-assessments-annual-report.pdf and College Board, https://reports.collegeboard.org/pdf/2018-oregon-sat-suite-assessments-annual-report.pdf

Chart 31



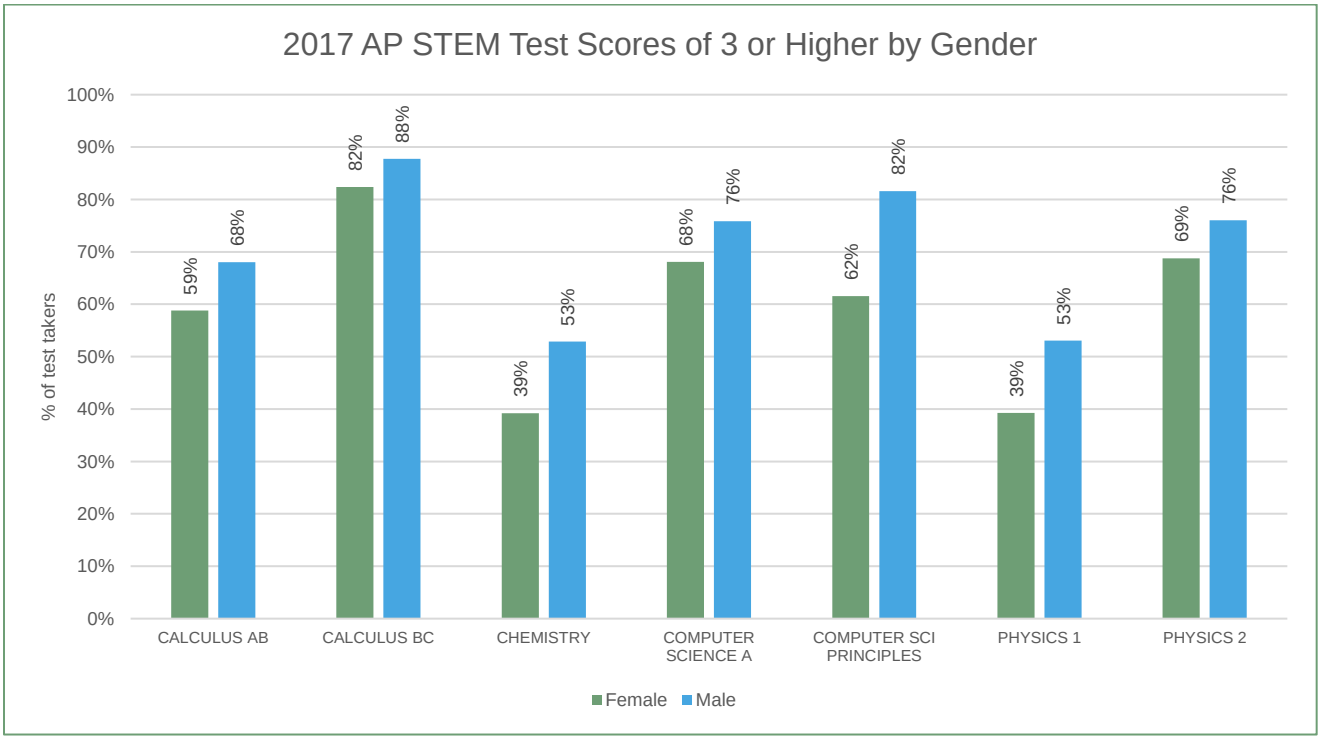
Note: student groups with less than 10 test takers were excluded

Chart 32



Note: student groups with less than 10 test takers were excluded

Chart 33



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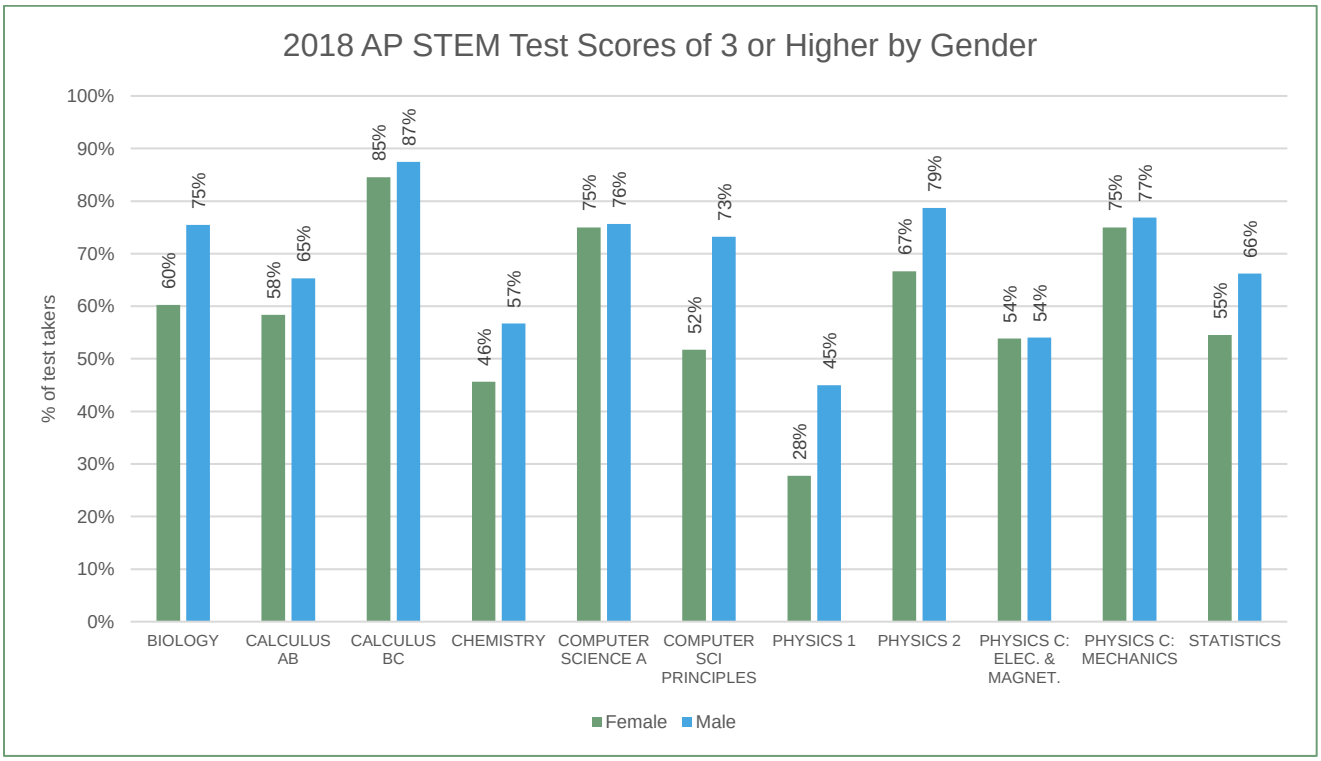

APPENDIX C: STEM INNOVATION GRANT FACT SHEETS

Oregon Mathways Initiative

Math in Real Life (MiRL)

Background

Math in Real Life (MiRL) supports the expansion of regional networks to create an environment of innovation in math teaching and learning. The focus on applied mathematics supports the natural interconnectedness of math to other disciplines while infusing relevance for students. MiRL supports a limited number of networked math learning communities that focus on developing and testing applied problems in mathematics. The networks help math teachers refine innovative teaching strategies with the guidance of regional partners and the Oregon Department of Education.

There are four categories of outcomes related to this project.

- Student mathematics content knowledge:
  - Increase student mathematics achievement aligned to Oregon standards through implementation of applied mathematics problems.
  - Decrease the mathematics achievement gap between historically underserved students and their peers through implementation of applied mathematics problems.
- Student attitudes and beliefs that are correlated to higher achievement:
  - Increase student interest and enthusiasm in math by providing more opportunities to engage in interactive, student-centered problems that are based in applied mathematics.
- Teacher instructional practices:
  - Increase pedagogical preparedness of teachers to successfully implement inquiry-based practices within applied mathematics instruction.
  - Increase teacher knowledge of the application of mathematics.
- Teacher attitudes and beliefs about themselves and students:
  - Increase teacher enthusiasm and self-efficacy for mathematics to stimulate inclusion of more challenging open-ended applied mathematics activities within instruction.
  - Increase teacher beliefs that *all* their students are capable of doing mathematics.

Identifying Rich Context

At the center of MiRL identification of a context that has potential for exploring rich mathematical content. Math teachers connect with context experts either in the school or in the community. By

interacting with these experts, math teachers are able to identify the potential connections to mathematics and applicability to grade-level expectations.

Purposeful Connection

Application of mathematics does not insure improvements in student understanding. Teachers have to help students make connections between context and content. Each MiRL lesson uses an approach sandwiches explicit teaching of relevant math content between uses of that content in context (Figure 1). A MiRL lesson starts with the context, makes a case for needing mathematics, addresses key mathematical concepts, and returns to context for assessment and transfer. The model is described in materials available through the link in the resources section.

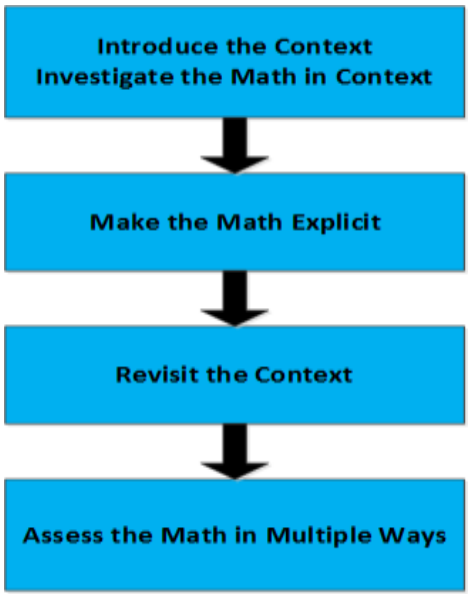

FIGURE 1 - DIAGRAM SHOWS THE RELATIONSHIP BETWEEN CONTEXT AND EXPLICIT MATH IN A CONTEXTUAL MATH LESSON.

Learning Communities

Teachers who have experienced MiRL lesson development find the process much more challenging than more familiar lesson planning. The context is often unfamiliar at first. Students are used to solving problems using simple algorithms and single types of mathematics. MiRL uses a learning community structure where teachers co-develop lessons, teach those lessons, and refine lessons based on their experience teaching.

Resources

Oregon Educator Network Math in Real Life

Contact

Mark Freed – Mark.Freed@ode.state.or.us

Grant Recipient: Oregon Computer Science Teachers Association
Grant Amount: $750,000 for current biennium (for 2 program years)

Purpose

The Digital Literacy and Computer Science Grant provided an opportunity for Oregon schools to expand their computer science offerings through two pathways, the SuperQuest educator training and a SuperQuest Spring Conference. It has also significantly aligned state efforts to national initiatives. Strength of the grantee include the extensive network and partnership capacity OCSTA has built statewide.

Goal 1: Increase Number of students with access to quality CS in K-12 classrooms and increase participation.	Goal 2: Support district plans to deliver CS	Goal 3: Connect teachers and administrators to funds/supports
Increase in CS courses in K-12 schools (increases in both computer programming and AP Computer Science courses)	**Support local development of CS education plans through collaboration with districts and national K-12 SC Framework** (Facilitated the development of a CS statewide workgroup who have collaboratively created the CS for Oregon Plan based on national CS frameworks and standards. This included a scope and sequence protocol)	Administrator Guide developed for district leaders developed via an advisory group consisting of industry, education and LEA leaders Planning a series of administrator sessions to better educate and address lack of administrator support
Increase number of K-12 CS teachers (Professional Development attendance increase, due to refundable deposit upon attendance)	**Provide a plan as model for other districts** ("CS Playbook" provides assistance for districts to develop short-term strategies for including computer science education while laying groundwork for long-term)	
Increase students of color and women in CS ("CS Playbook clearly addresses equity and increased access to underrepresented students in the computer science field)		

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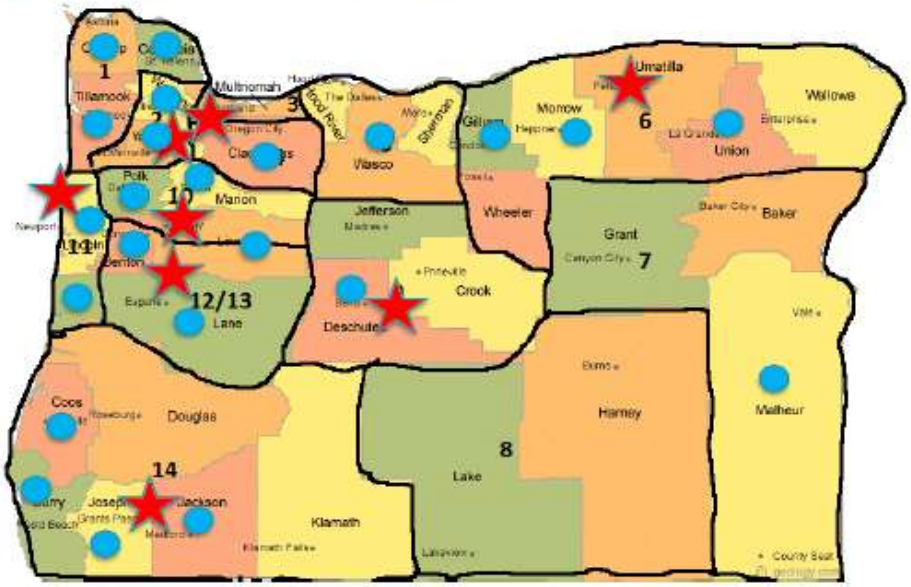
By the Numbers (17-18 School Year)

- Number of professional development opportunities held throughout the state: one SuperQuest Spring Conference and 8 three-day SuperQuest workshops
- Number of AP Computer Science courses: 36 (three-fold increase)
- Number of computer programming teachers: 118 (up from 84 last year)
- Number of educators participating in the 2018 SuperQuest Trainings: 283
- Number of students reached (estimated): 9,563

Geographic Distribution of Professional Development

★ SuperQuest 2018 Professional Development Sites

● Educator attendance by County



Contact

Deborah Bailey (503) 947-0046 Deborah.bailey@state.or.us

STEM Beyond School
November 2018

Purpose

To expand STEM opportunities and student STEM interest, motivation and enthusiasm in STEM-related activities and careers among historically-underserved students in grades 3-8 by supporting high-quality out-of-school STEM programming, professional development and a statewide network for community-based out-of-school-time providers. Specifically the outcomes of the grant are to:

- Increase or maintain student STEM identity and motivation resilience in STEM-related activities.
- Ensure that students have opportunities to develop a mindset and confidence to envision their future within STEM careers.
- Increase opportunities for students to engage in interactive student-centered, applied learning.
- Increase out-of-school STEM programming to historically underserved student populations (grades 3-8) in science engineering, and mathematics.
- Develop a statewide network of out-of-school providers to disseminate and implement effective practices, ideas and resources for STEM-related education.
- Develop baseline data elements to inform size, scope, quality and student outcomes of out-of-school STEM-aligned activities
- Increase opportunities for career-connected learning to ensure students see and believe they have a pathway for achieving a high school diploma and post-high school careers related to STEM.

By the Numbers (17-18 School Year)

- Grant Recipient: Oregon State University Extension Service
- Amount: $1.2 Million (Biennium – 2 program years)
- Number of students reached: 907 statewide in 2017-2018 school year
- Number of STEM program hours OFFERED: 3,788
- Percentage of surveyed students that met one or more criteria for underserved/disadvantaged: 87%
- Total hours attained by participating students in grades 3-8: 45,786
- Total Professional Development hours attained by educators: 1174

Unforeseen Benefits of the Grant

The STEM Beyond School project was selected as one of only 10 Oregon State University Outreach and Engagement Awards for Excellence in 2018. The Division of University Outreach and Engagement recognizes outstanding projects that significantly advance the mission of outreach and engagement across the university

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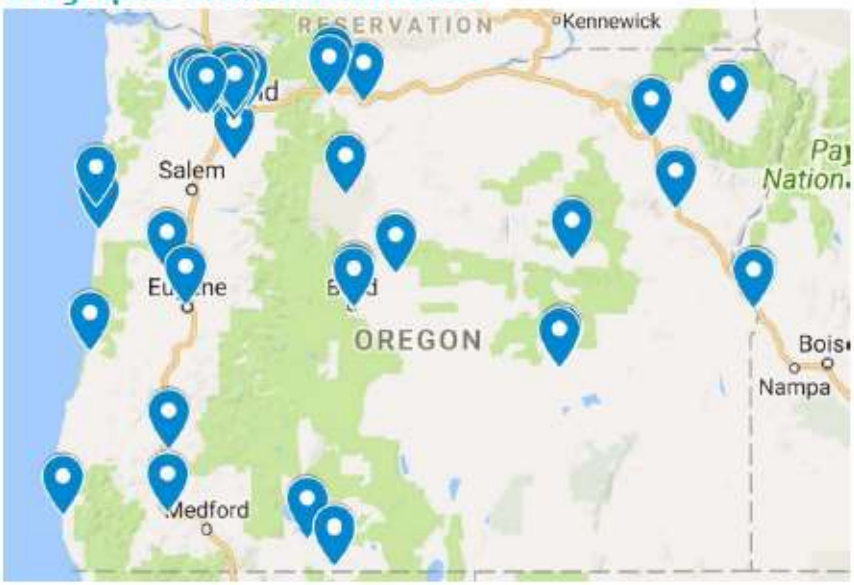
and throughout Oregon. Awards were presented at the Vice Provost Awards for Excellence event on May 14, 2018 at the OSU Memorial Union Ballroom.

Overarching Impact

Youth who entered the program with an already strong science interest and identity maintained their strong interest and identity, while youth who entered with a lower rating demonstrated significant increases in identity-related outcomes across all six measures.

Individual program quality is described by the evaluation report as "diverse, engaging and highly interactive" (p.2) with most programs engaging students in two or more NGSS practices and the majority of programs adopting two of the 4 Core Programming Practices: Students as Do'ers & Designers and Youth Interests Drive Programming. Programs involved in the SBS project provided a wide range of opportunities for youth to engage in interactive, student-centered, applied learning, particularly in the Math and Science/Engineering content that is aligned to NGSS practices.

Geographic Distribution of Sites



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HIGHER EDUCATION COORDINATING COMMISSION