HIGHER EDUCATION COORDINATING COMMISSION

STEM Investment Council Annual Report to the Legislative Assembly

December 2019

INTRODUCTION

This report fulfills the STEM Investment Council's obligation under ORS 326.500 to submit an annual report to the State Board of Education, Higher Education Coordinating Commission and the Legislative Assembly on progress made toward achieving Oregon's STEM education goals and on state investments in STEM education.

In 2019, the STEM Investment Council focused its efforts on a) evaluating the results of the 2017-19 STEM Innovation Grants, b) working with the Department of Education (ODE) and Regional STEM Hub Network to develop a slate of STEM Innovation Grant projects for the 2019-21 biennium, and c) reviewing the current STEM Education Plan and preparing for the revision process in 2019.

This report includes:

- The most recent available data on Oregon's STEM education goals, as set forth in statute, and plans to identify additional, meaningful metrics to measure progress and success.
- A summary of the STEM Investment Council's work in 2019 and its plans for the 2019-21 biennium.
- Impact data for the Regional STEM Hub Network and information on individual STEM Hubs' work in the 2018-19 school year.
- A summary of the outcomes of the 2017-19 STEM Innovation Grants and an introduction to the 2019-21 STEM Innovation Grants.

STEM EDUCATION GOALS

LEGISLATIVELY MANDATED GOALS

ORS 326.500 sets forth the following STEM education goals for Oregon:

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.

These goals are highly ambitious. For example, in 2019, Minnesota had the highest percentage of students scoring proficient or above on the mathematics National Assessment of Educational Progress at 53 percent.[1] Doubling Oregon's percentage of students in the 2018-19 school year scoring proficient or above on its statewide mathematics assessment would mean 76.6 percent of students scoring proficient or better – a far higher percentage than the best performing state in the nation.

Furthermore, as we know, true system-wide change takes time, enormous effort, accountability, and sustained investment. Each year, the 13 regional STEM Hubs are impacting more and more students, educators, administrators, and districts, transforming learning through career-connected, interdisciplinary, applied instruction and content. While we don't expect to see significant gains in statewide assessment results from these STEM education efforts yet, we are confident that, with meaningful investment and support, these efforts will move the needle. To get there, the state needs real commitment from state agencies, STEM hubs, school districts, schools, business & industry, and other stakeholders to implement Oregon's STEM Plan.

The following tables show the percentage of Oregon students performing proficient or above on statewide 4th and 8th grade mathematics and 5th and 8th grade science assessments[2][3] and the number of postsecondary STEM degrees and credentials earned at Oregon public community colleges and universities.[4]

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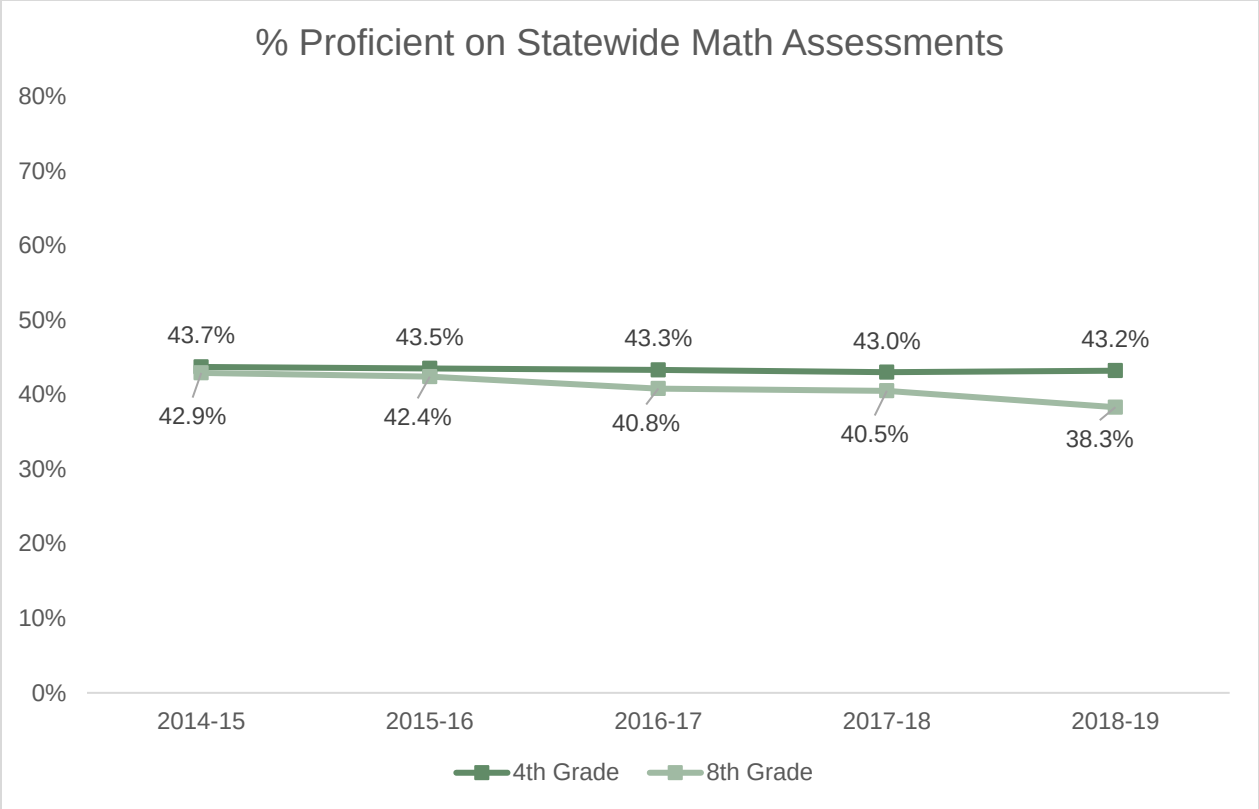
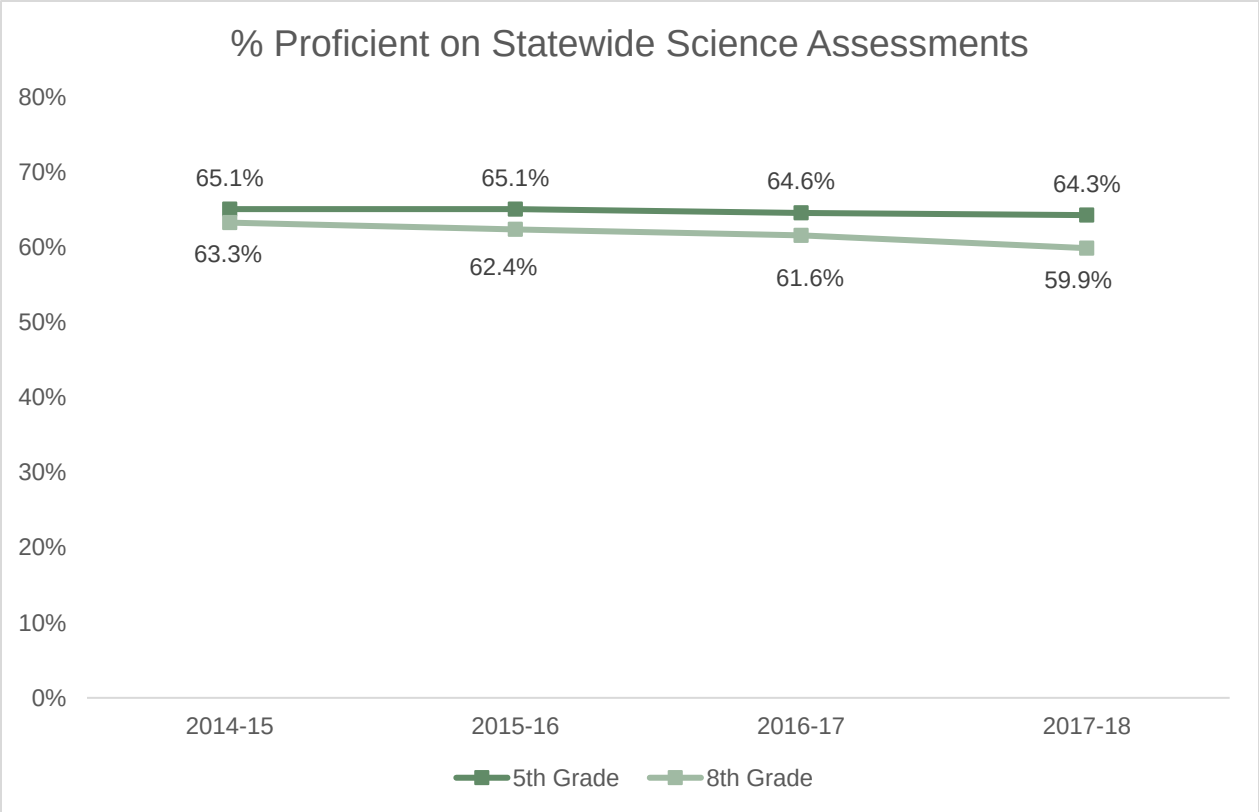
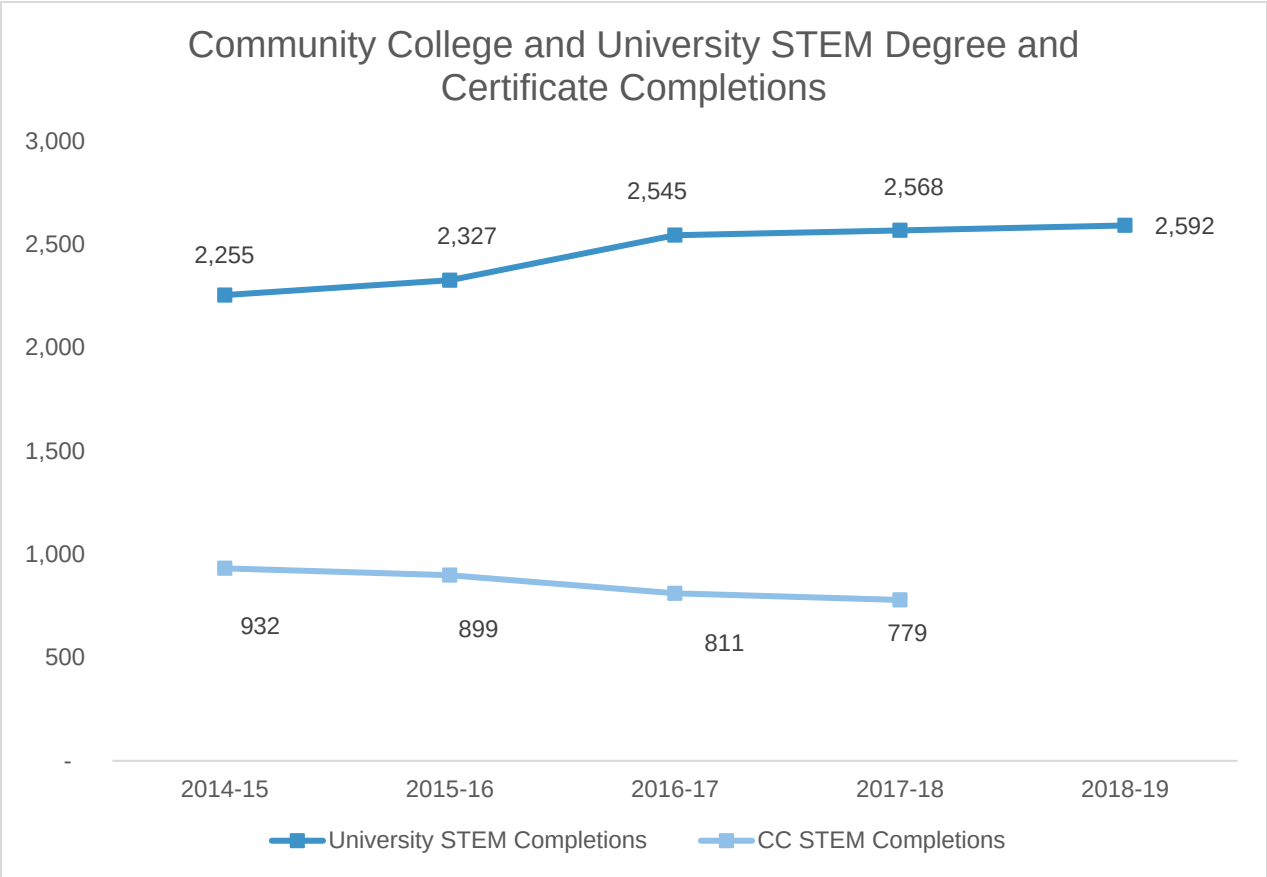
[1] The Nation's Report Card, https://www.nationsreportcard.gov/mathematics/states/achievement/?grade=4
[2] Oregon Department of Education
[3] Statewide science assessments are administered in 5th grade, not 4th grade.
[4] Higher Education Coordinating Commission, Office of Research & Data


% Proficient on Statewide Math Assessments
80%
70%
60%
50%
40%
30%
20%
10%
0%
43.7%
43.5%
43.3%
43.0%
43.2%
42.9%
42.4%
40.8%
40.5%
38.3%
2014-15
2015-16
2016-17
2017-18
2018-19
4th Grade
8th Grade


% Proficient on Statewide Science Assessments
80%
70%
60%
50%
40%
30%
20%
10%
0%
65.1%
65.1%
64.6%
64.3%
63.3%
62.4%
61.6%
59.9%
2014-15
2015-16
2016-17
2017-18
5th Grade
8th Grade



IDENTIFYING MORE MEANINGFUL GOALS AND METRICS

Recognizing that statewide assessments are blunt, far from perfect indicators of the impact of the Regional STEM Hub Network, in 2019, the STEM Investment Council and Regional STEM Hub Network, in partnership with ODE, began the work of identifying additional meaningful goals and metrics. This work will be a central focus of the Council and Hub Network in 2020, with the goal of completing a STEM "data dashboard" for Oregon.

STEM INVESTMENT COUNCIL

HISTORY, VISION, AND COMPOSITION

History and Purpose

In 2013, the Legislative Assembly passed and Governor Kitzhaber signed into law House Bill 2636, which, among other things, established the STEM Investment Council. The council's statutory functions are to:

1) Assist the State Board of Education (State Board) and HECC in developing and overseeing a long-term strategy to advance Oregon's target outcomes around STEM education.
2) Advise the Superintendent of Public Instruction and Executive Director of the HECC on the administration of the state's investments in STEM education, including grants for the Regional STEM Hub Network and STEM Innovation grants.

3) Submit an annual report to the State Board, HECC, and Legislative Assembly on progress on Oregon's STEM education goals and the state's investments in STEM education.

The Council also provides guidance to the Regional STEM Hub Network, encourages collaboration between education and business & industry, and raises awareness and understanding of STEM education in the education sector, business & industry, and the broader public.

An Equitable Vision for STEM Education in Oregon

The STEM Investment Council established the following vision for STEM education in Oregon:

"Reimagine 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"

The Council is committed to seeing its vision – and the state's statutory STEM education goals – realized for all student populations – most especially, for students from underserved and underrepresented communities. We know that there are severe disparities across demographic groups in access to and success in STEM education, and, as a result, in representation in the STEM workforce. As we track progress on Oregon's STEM education goals and metrics, we must disaggregate the data by race/ethnicity, gender, socioeconomic status, rural/urban status, and any other demographic characteristic correlated with underrepresentation in STEM fields. The state, led by the Regional STEM Hub Network, must employ targeted strategies to shrink opportunity and attainment gaps in STEM. The Council believes that closing these gaps is both a moral and economic imperative.

Composition

The STEM Investment Council is business-driven, comprising nine voting members from the private sector, jointly appointed by the Superintendent of Public Instruction and Executive Director of the HECC. The Council is also to recruit additional non-voting members from K-12 and postsecondary education, may recruit non-voting members from additional stakeholder groups, and may establish advisory and technical committees.

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.

EXPANDED MEMBERSHIP PLAN

In 2019, the STEM Investment Council developed a plan for recruiting new members – voting and non-voting – to join the council in 2020, if approved by the Superintendent of Public Instruction and Executive Director of the HECC. At the beginning of 2020, several voting members of the STEM Investment Council plan to cycle off. These members have been on the Council since its establishment and recognize the value in allowing other business leaders to play a leading role on STEM education in Oregon. In its recruitment of new members, the Council was intentional about ensuring a diversity within its membership, especially across Oregon's growth STEM industries, but also in terms of race/ethnicity, gender, geographic location, and rural vs. urban communities.

In addition to the transitions among the Council's voting members, in 2020, the Council will have a host of new, non-voting advisory members. The council knows that all stakeholder groups – and particularly educators and school administrators – provide invaluable insight on STEM education policy, strategy, and investments. In 2020, new council members will include a K-12 educator, school administrator, and district administrator, and representatives of community colleges, universities, community-based organizations, and other regional collaboratives.

STEM EDUCATION PLAN 2.0

In its initial years of existence, the STEM Investment Council developed Oregon's first STEM Education Plan. The Council completed that plan in November of 2016 with Governor Brown's endorsement. It set forth the following four, overarching 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 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.

The inaugural STEM Education Plan introduced a sweeping, comprehensive vision of the future of Oregon's education system – a system predicated on STEM education principles and practices.

In 2019, the Council held several work sessions to review and comment on the current version of the STEM Education Plan. The Council determined that the next iteration of the plan will be more focused and actionable, and will include specifics around accountability for achieving the goals set forth in the plan. In particular, the Council believes that assigning roles and responsibilities to state agencies, STEM Hubs, school districts, schools, and other key stakeholders is critical to achieving the STEM Education Plan's vision and realizing Oregon's STEM goals. These entities must feel ownership over the STEM Education Plan and its components in order for systemic change to occur.

Furthermore, the Council was clear that any new iteration of the STEM Education Plan must continue to focus the state's efforts on serving the students who face the greatest barriers to a future in STEM.

Much must be done to achieve Oregon's statutory goals and the vision set forth in the original STEM Education Plan, but, with limited resources and capacity within Hubs, schools, and school districts, the Council must determine which initiatives, programs, and policies are most critical in the near term, and who is responsible for their implementation. In 2020, the council will undergo a comprehensive revision of the STEM Education Plan.

STEM INNOVATION GRANTS

The STEM Investment Council recommends to ODE the projects it believes should be funded by STEM Innovation Grants. The council receives regular reports on these projects throughout the biennium.

For the 2017-19 biennium, ODE adopted the council's recommendation to continue funding for three projects funded in the 2013-15 biennium: Math in Real Life, Digital Literacy & Computer Science, and STEM Beyond School. For the 2019-21 biennium, the council recommended a slate of new STEM Innovation Grant categories, which ODE accepted. Additional information about the 2017-19 and 2019-21 STEM Innovation Grants is included later in this report.

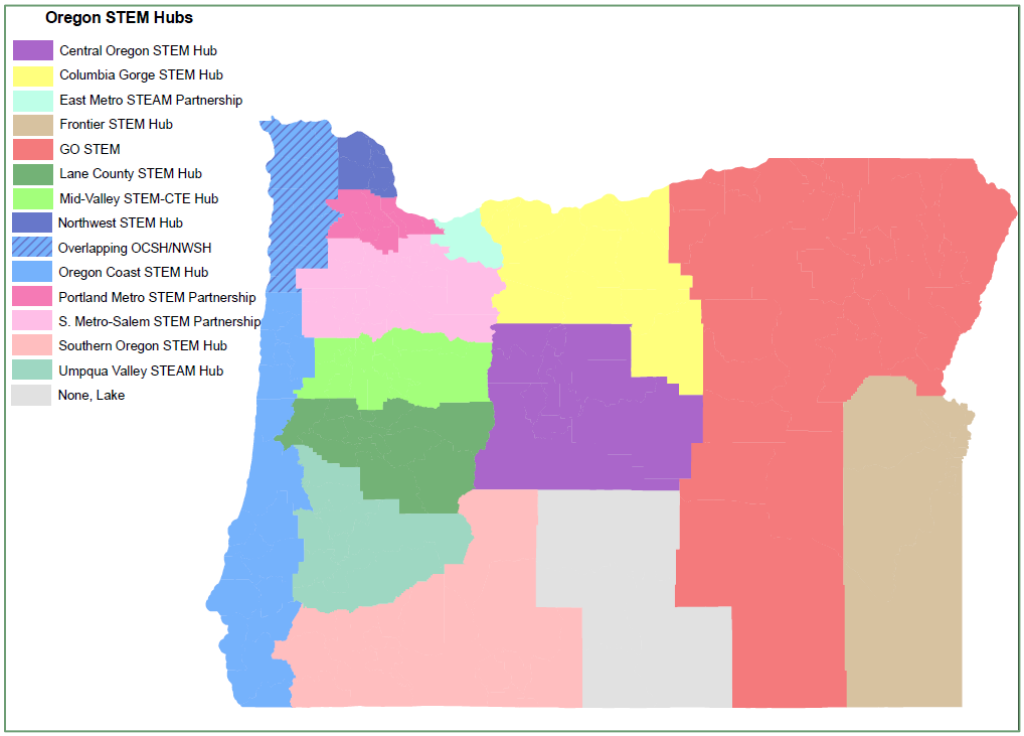
REGIONAL STEM HUB NETWORK

Oregon's Regional STEM Hub Network comprises 13 STEM Hubs throughout the state. STEM Hubs are multi-sector partnerships linking P-20 educators, schools, school districts, and education service districts to business & industry, CTE regional coordinators, workforce development, economic development and community-based organizations.

Hubs devise local solutions to meet local needs by coordinating regional communication and partnerships, improving student outcomes, building capacity and sustainability for change, and encouraging and supporting local and statewide engagement. Through their coordination and alignment work, Hubs increase efficiency in the system.

The Network began with six Hubs and has since expanded to 13. In the 2013-15 biennium – the first biennium in which the Regional STEM Hub Network received state funding – the Network received $2.7 million. The Network received roughly $4.8 million for the 2019-21 biennium. Though the size of the Network has more than doubled, the funding has not kept up.

A snapshot of each hub can be found below in Appendix A.



2017-19 BIENNIUM DATA[5]

STEM Hub Impact Data	Value	Units
Number of educators who participated in Hub professional development or programs	5,414	Educators
Number of educator hours spent in Hub professional development and programs	54,601	Educator Hours
Average number of professional development hours per educator	10	Hours
Projected number of students impacted by educator professional development participation	272,191	Students
Percent of students in Oregon impacted by STEM Hub professional development to their teachers	47%	% of students in Oregon
Number of industry volunteers who participated in Hub activities	3,294	Industry Volunteers
Number of industry volunteer hours	17,934	Industry Volunteer Hours
Number of students who participated in Hub directed programs	59,235	Students
Number of student hours in Hub directed programs	218,208	Student Hours
Estimate of students who benefit from equipment loaning programs	75,301	Students
Estimate of teachers who benefit from equipment loaning programs	1,230	Educators
STEM Hub Leveraged Funding		$
Grants and sponsorships (current biennium)		$2,603,562
Partner investments in Hub initiatives		$1,630,770
In-kind time and resources		$1,543,393
Funding and in-kind secured for future biennia		$3,110,702
Total		$8,888,427

PROJECT IMPACT

In an effort to build capacity within the STEM Hubs and their partners, ODE, in collaboration with the Ford Family Foundation, funded an opportunity for STEM Hubs and community partners to participate in a 10-month graduate-level learning experience called Project Impact, guided by Dialogues in Action. This allowed a deep dive into understanding the core work of utilizing impact evaluation to determine what's working and what needs to change. Seven of the 13 STEM Hubs participated, including Central Oregon STEM Hub, East Metro STEAM Partnership, Greater Oregon STEM Collaborative, NW STEM, Portland Metro STEM Partnership, Southern Oregon STEAM Hub, and Umpqua Valley STEAM Hub.

[5] Collected by the Regional STEM Hub Network

Two primary questions guided the evaluation:

1. What kind and quality of impact are Hubs having?
2. What is causing or contributing to the impact?

Each of the seven participating STEM Hub teams designed and implemented a mixed-method approach to data collection. For the qualitative inquiry, the teams designed interview protocols, identified a sample of interviewees using purposeful stratified sampling technique, collectively convened 85(+) in-depth interviews with educators and community partners, analyzed the data from the interviews, and developed themes from the entire data corpus. For the quantitative inquiry, the teams designed surveys that were deployed to educators and community partners.

Key findings show that the STEM Hubs are beginning to show impact in their regions:

1. Industry and education partners are excited at the opportunity to better **align educational strategies and industry needs.**
2. Many educators are recognizing the value and potential of **STE(A)M learning as a strategy for increasing equity** in STE(A)M fields and education as a whole, highlighting the relationship between the two.
3. Educators and partners are shifting their understanding of STE(A)M learning: rather than seeing it as an isolated group of subject areas, educators and partners are **beginning to see STE(A)M as a methodology** and an approach to learning and thinking.
4. Educators are **using STE(A)M methods and content across disciplines to model the interdisciplinary nature of STE(A)M** , integrating it into subjects such as reading, writing, and social studies.
5. STEM Hubs are giving educators the opportunity to **step into leadership roles as STE(A)M champions** , while working with formal leaders to redefine how they support STE(A)M education.
6. Educators reported **increased student engagement and improved attendance** when STE(A)M thinking principles were implemented.
7. Educators report that when engaged through STE(A)M based learning, students are more willing to think outside the box and work through hard problems **, encouraging growth mindset and student voice.**

The factors that contribute to these findings include:

1. Oregon STEM Hubs are fostering **a STE(A)M-focused support network, building confidence and inspiring collaboration** among educators and partners.
2. **Professional development opportunities are fostering a safe space for educators** to explore STE(A)M learning and grow their confidence and identity as STE(A)M educators.
3. By using a student-directed approach in classrooms, a major strategy in STE(A)M learning, **teachers are shifting their role to facilitating inquiry** rather than directly providing information and answers.

While implications and next steps vary across each STEM Hub, areas of common or shared work include the following:

1. Cultivating STE(A)M champions and leaders
2. Strengthening and showcasing equity efforts
3. Expanding high-level, practical professional development opportunities that build educator skills and knowledge related to classroom strategies, modeling, and cross-curricular/integration of STE(A)M
4. Improving community outreach, partner communication, and advocacy efforts
5. Better engaging formal leaders such as district administrators and community program directors
6. Deepening networking and partnership development, especially with industry, and
7. Identifying, sharing, and developing more resources to support this work

The Regional STEM Hub Network intends to develop a set of common metrics and supporting methodologies and tools. In addition, the Network hopes to continue to build its impact evaluation "muscle" in a second phase of work. While a primary focus of STEM Hubs is building educator confidence and greater connections with

community partners, including business & industry, Hubs' primary goal is to impact systems for lasting change. For true systemic change to occur, STE(A)M strategies and mindsets must be adopted across all learning environments, P-20 and formal & informal.

STEM INNOVATION GRANTS

STEM Innovation Grants are designed to expand the implementation of effective programs related to STEM education, and to test out innovative approaches or programs that transform the way our students learn and improve student outcomes. Funded projects must specify how the program or project will serve a significant number of underserved and underrepresented students and, if proven successful, how the approach will be brought to scale across the state and sustained beyond the term of the grant.

2017-19 GRANTS

Following the STEM Investment Council's recommendation, ODE continued funding for three major projects in the 2017-19 biennium with STEM Innovation Grants: Math in Real Life, Digital Literacy and Computer Science, and STEM Beyond School. These projects were originally funded by the 2013-15 STEM Innovation Grants. The Legislative Assembly funded STEM Innovation Grants at $4,430,000 in the 2017-19 biennium.

Math in Real Life (~$1,350,000)
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.

Outcomes of the 2017-19 Math in Real Life grant include:

- 183 high school and middle school teachers from 70 schools in 45 school districts participated in Math in Real Life professional development.
- The projects provided, on average, 42 hours of professional development per teacher which included lesson development, interaction with context experts, and externships.
- 176 lessons were developed or refined as part of the professional development which directly impacted approximately 5600 students.
- Math in Real Life experiences were shared at two summer institutes held at Oregon State University, Confederation of Oregon School Administrators conference, the Northwest Math Conference, and the National Council of Teachers of Mathematics conference.
- 6 rural schools in northeast Oregon are piloting a high school math course that combines application with Mathematical Modeling. The course was developed and shared by the Ohio Department of Education.

Digital Literacy & Computer Science (~$750,000)
Digital Literacy & Computer Science supports the creation of a state plan for digital literacy and computer science education, as well as the development of a network of teachers who will produce and deliver long-term professional development leading to the creation of new CTE programs of study in computer science. The grant also supports the expansion of SuperQuest trainings – high quality professional development in digital literacy and computer science.

Outcomes of the 2017-19 Digital Literacy & Computer Science include:

- 567 unique educators participated in three-day SuperQuest trainings, benefiting an estimated 28,000 K-12 students in the coming years.

- Summer SuperQuest trainings were held in 29 of Oregon's 36 counties.
- 97% of educators found the SuperQuest training workshops "extremely valuable" or "very valuable."
- The majority of SuperQuest attendees – 57% – were first time attendees at a SuperQuest workshop.
- Prior to the SuperQuest trainings, attendees 76% reported their subject knowledge level as "not at all knowledgeable" or "slightly knowledgeable"; after the training 93% reported feeling "very knowledgeable" or "moderately knowledgeable."
- Prior to the SuperQuest trainings, 10% of attendees reported feeling "completely to very confident" in their ability to teach the subject content, that percentage increased to 61% after the 3-day training.
- The Computer Science Teacher Education Association's Fall and Spring Symposiums had over 242 participants from a wide range of sectors: high school educators, university and college faculty and administrators, industry experts and government representatives.

STEM Beyond School (~$1,200,000)
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.

Outcomes of the 2017-19 STEM Beyond School include:

- 1,590 youth participated in 73,678 hours of STEM programming and field trips.
- In the first year of the biennium, 87 percent of youth served by SBS were from historically underserved student populations (these data for the second year of the biennium are not yet available).
- Based on pre- and post-survey scores, the average youth participating in SBS maintained their STEM identity and motivational resilience over time.
- Based on pre- and post-survey scores, youth who initially had low-interest in STEM became more interested and engaged in STEM following participation in SBS.
- Developed a statewide network of out-of-school STEM providers.

In addition, ODE allocated approximately BLANK in funding from the STEM Innovation Grant funding stream to individual STEM Hubs for Hub-directed innovative projects and programming. These grants focused on:

- Efforts that increase cross-STEM Hub collaboration.
- Efforts that increase regional participation in the three STEM Innovation grant areas (Math in Real Life, STEM Beyond Schools, Computer Science and Digital Literacy).
- Efforts that increase time on science in elementary school.
- Efforts that increase Youth Voice in STEM Education.
- Efforts that increase communication of STEM education efforts.

2019-21 GRANTS

In the 2019-21 biennium, the Legislative Assembly continued funding for STEM Innovation Grants at current service level, or, $4,601,636. For the 2019-21 biennium, the STEM Investment Council recommended that the majority of STEM Innovation Grant funding be allocated to three new grant categories: School-wide STEM Transformation, STEM Leaders, and Innovative Programming. Projects in these categories must impact a significant number of students from underserved and underrepresented communities. They also must involve collaboration across two or more STEM Hubs in order to promote both regional and cross-regional partnership.

The Council recommended that the remaining funds be used to sustain the progress and success resulting from Math in Real Life, Digital Literacy & Computer Science, and STEM Beyond School.

If these projects – those newly funded and those being sustained – prove successful, the Council believes that ODE should fund their implementation statewide.

School-wide STEM Transformation Grants (~$900,000)
School-wide STEM Transformation grants use STEM education as the basis for lasting school-wide transformation at the elementary and middle school level. Many of Oregon's administrators and classroom educators already understand the power of STEM education and have created pockets of STEM excellence in their classrooms and schools. To ensure that these efforts reach beyond one administrator or educator – beyond a single classroom or one employee's tenure at the school – cultivating a school-wide STEM culture is necessary.

Participating Hubs will identify elementary and/or middle school partners that agree to undergo a rigorous transformation process that will include:

- Establishing STEM leadership teams at each participating school
- Participation by school leadership teams in a professional learning community
- Developing a STEM School rubric and designation process
- Developing individualized STEM transformation plans for each school
- Participating in sustained STEM professional development

STEM Leader Grants (~$1.1 million)
STEM Leader grants develop school and district administrator and teacher leaders who have a deep understanding of STEM pedagogy and STEM education's power to transform student outcomes. STEM administrator and teacher leaders will create the conditions for STEM integration in our elementary and middle schools, and make the goal of STEM integration become a reality.

Participating Hubs will:

- Provide a series of professional development opportunities to cohorts of elementary and/or middle school and district administrators and teacher leaders on topics including, but not limited to:
    - Equity in STEM
    - Integration of applied learning, project-based learning, problem solving, and inquiry into curricula
    - Integration of Next Generation Science Standards into curricula
    - Partnerships with industry and community-based organizations
    - Increasing time on science and math
    - System-change and school transformation
- Develop a network of STEM administrator and teacher leaders that will:
    - Provide STEM professional development to fellow administrators and teachers
    - Promote STEM education and shape STEM policy at the school, district, and state level
    - Identify and share STEM resources and best practices with the broader education community
    - Serve as a resource for pre-service teacher preparation programs

Innovative Programming Grants (~$1 million)
Innovative programming grants will expand regional implementation of innovative ideas related to the STEM Education Plan's goals. Projects under this grant category will focus on:

- Efforts that increase cross-Hubs collaboration
- Efforts that increase time on science in elementary school
- Efforts that increase youth voice
- Efforts that increase use of Oregon Connections
- Efforts that increase communication of STEM education efforts.

Sustainability Grants (~$1.6 million)
Sustainability grants support the continued operation, expansion, and evolution of successful projects and programs, while building capacity to sustain the work following the end of the grant term. The projects funded for the 2019-21 biennium include:

- Digital Literacy & Computer Science (~$700,000)
- STEM Beyond School (~$500,000)
- Math in Real Life (~$250,000)
- Oregon Connections (~$52,000)

CONCLUSION

In order to continue the Oregon's progress toward transforming our education system into a STEM ecosystem, the STEM Investment Council has developed the following work plan for the 2019-21 biennium:

1. **STEM Education Plan Update:** The Council will write the second iteration of the plan, creating a more focused and actionable document with specifics around accountability for achieving the goals set forth in the plan.
2. **STEM Data Dashboard:** The Council, in collaboration with ODE, HECC, and the Regional STEM Hub Network, will identify a set of metrics – beyond scores on standardized tests and postsecondary degree/credential production – to measure progress.
3. **STEM Innovation Grant Monitoring:** The Council will receive regular reports from ODE and the Regional STEM Hub Network on the 2019-21 STEM Innovation Grants.
4. **Regional STEM Hub Network Advising:** The Council will receive regular reports from the STEM Hub Network and will advise the Network to ensure alignment and efficiency.
5. **Policy Analysis and Development**: The Council will analyze Oregon's current policy related to STEM education – including general P-20 and CTE policy – and develop policy recommendations where needed.

Again, with limited resources and capacity, the Regional STEM Hub Network, with the support of ODE, HECC, and the STEM Investment Council, has had meaningful impact across the state. In order to make that impact systematic, however, the Council recommends increased investment in the Network and STEM programming, as well as in agency capacity to support his work.

APPENDIX A: REGIONAL STEM HUB FACT SHEETS

1. CENTRAL OREGON STEM HUB

Mission

The Central Oregon STEM Hub is a partnership connecting regional pre K-12 education, higher education, industry, and community partners to catalyze opportunities and exploration in science, technology, engineering, and math (STEM).

Vision

Through collaboration, Central Oregon STEM Hub partners prepare students to be critical thinkers, career-ready and college-bound students, and informed global citizens through integrated STEM opportunities in and out of the classroom.

Equity

Objective: Every Central Oregon student has access to and is engaged in high-quality STEM opportunities in and out of school.

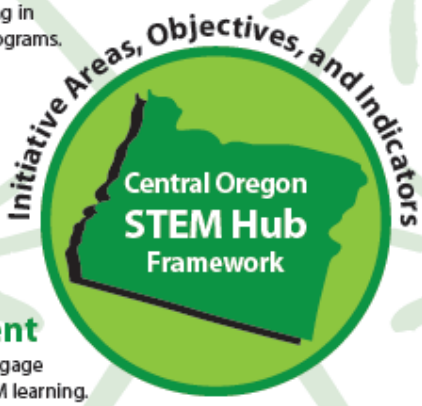
Indicator: Number of STEM learning opportunities available across counties (formal and/or informal).

Indicator: Number of [historically underserved and underrepresented] students participating in out-of-school STEM experiences and programs.

School Systems

Objective: STEM learning is integrated and prioritized across grade-levels and addresses student barriers, fosters STEM fluency, and student achievement.

Indicator: Growth in time dedicated to STEM learning (measuring time spent in STEM).



Well-Lit, Aligned Pathways

Objective: Young people are aware and ready to enter STEM post-secondary opportunities and careers.

Indicator: Number of times kids have been exposed to STEM experiences.

Indicator: Number of STEM certificates and degrees earned [especially by underrepresented and nontraditional students].

Educator Development

Objective: Central Oregon educators engage students in high-quality integrated STEM learning.

Indicator: Educator confidence in teaching STEM.

Indicator: Educator STEM pedagogical and content knowledge.

STEM Identity & Engagement

Objective: Students are interested in and possess STEM knowledge and skills to succeed in a complex future.

Indicator: Number of students enrolled and completing MS/HS/Post-Secondary STEM Courses.

Indicator: Retention in STEM certificate and degree programs.

Indicator: Participation in out-of-school STEM experiences.

Sustained, Reciprocal Investments

Objective: A vibrant STEM ecosystem is part of Central Oregon's reputation and attracts industries and families to live, work, and learn here.

Indicator: Partners use regional assets and environments to spark interest in STEM.

Indicator: Number of business and industry partners engaged in the STEM Hub network.

2018-2019 HIGHLIGHTS BY INITIATIVE AREA

EQUITY	The Central Oregon STEM Hub has a focus on equity and creating programs that specifically serve marginalized and non-traditional populations. This year, equity training was intentionally embedded into all STEM Hub professional development and career-connected learning opportunities for students.
SCHOOL SYSTEMS	We cannot build a pipeline for industry or engaged students if we do not invest in our school systems to teach STEM principles. The Central Oregon STEM Hub is creating a mindset shift around STEM education, creating an environment that is less about the acronym and more about how we teach and learn. We made a concerted effort in conversation and in branding to remove the periods in the STEM acronym and focus on STEM as a way of teaching and learning through relevant hands-on problem solving.
EDUCATOR DEVELOPMENT	This past year we worked diligently to build our K-16 relationships, with 511 educators participating in HUB professional development or programs. We provided focused, content-specific trainings with the majority of the programming through some form of professional learning community. We measured a direct correlation of our safe professional learning space to an increase in confidence in the classroom as a STEM educator. Educators are more confident to embrace inquiry, wonder, and real-world learning at the heart of their practice.
WELL-LIT, ALIGNED PATHWAYS	Our relationships with Career Technical Education and our local workforce investment board align our priorities to local high growth, high demand STEM careers in the computer science, healthcare, advanced manufacturing, and construction fields. By providing career-connected learning opportunities for young people we exposed them to STEM options for post-secondary education and careers. Over 8,000 youth participated in STEM Hub programming this year.
STEM IDENTITY & ENGAGEMENT	We strive to build both STEM identity and confidence. Young people are encouraged to be makers, creators, doers, and thinkers in charge of their own learning. Youth voice and choice related to STEM experiences continue to expand as their STEM knowledge and skills increase. Regionally we are focused on gaps in STEM learning specifically related to increasing computer science and elementary science learning opportunities for our youth.
SUSTAINED, RECIPROCAL INVESTMENTS	The exponential growth in our region is fueling new educators, new students, and new industry partners. We continue to grow the awareness of STEM education in our community and the investment of local STEM business and organizational partners in their time, money and insight in our youth. Our STEM advocates gather and connect to inspire unexpected and transcendent STEM possibilities, and we logged 4,067 volunteer hours in STEM activities this year.

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

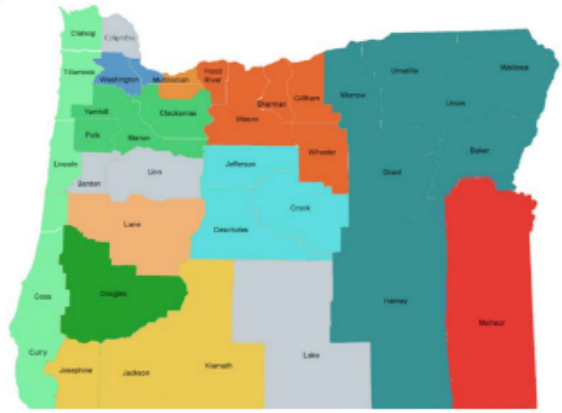
In the counties of

- 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

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

Significant Projects 2018-19

STUDENT PROGRAMS

CHIEF SCIENCE OFFICERS:

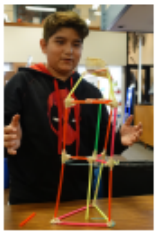
- National student leadership program supported by NSF. Collaboration with STEM Hubs in Eastern & Southern Oregon.

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; 2,275 student impact hours.



OTHER EFFORTS INCLUDE:

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

EDUCATOR SUPPORT

MICROGRANTS TO EDUCATORS:

- 19 innovative projects funded in 4 counties. Estimated students impacted: ~1,769
- >80% of students impacted come from at least one population underrepresented in STEM

OTHER EFFORTS INCLUDE:

- Annual STEM Symposium (teacher professional development), 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: 2018-2019

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, four action teams comprised of committed partners (see image below), work together to move the region toward EMSP's vision.

Impact Data

- 95 educators received a total of 1,242 professional development hours, reaching an estimate of 30,402 students as a result.
- 146 students participated in EMSP-supported or EMSP-funded programs, resulting in 6,740 hours of STEAM.

eastmetrosteam.org landen.zernickow@mhcc.edu 973-978-1868

Selected Initiatives

Listening Sessions and STEM Equity Self-Assessment Tool [State STEM Plan Goal Area 1]

- The Equity and Empowerment Team, led by Co-Chair Bernard Rahming, held five listening sessions in three languages, reaching 43 people. The lessons learned from these sessions resulted in the development of a draft STEM Equity Self-Assessment Tool.

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

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

- In 2019, in collaboration with All Hands Raised, Worksystems, and Impact NW 220 educators visited 28 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 served 30 or more youth in grades 3-8 for at least 50 student hours. At least 70% of students were underserved. Staff participated in 70 professional development hours.
- Metropolitan Family Services hosted a site through its SUN School at West Powellhurst Elementary (David Douglas School District).
- Saturday Academy hosted a site through a winter and spring class at three locations located in Gresham-Barlow and Reynolds School Districts, 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
- Four students developed a brochures for industry, educators, and community members, and 4 video vignettes of EMSP target audiences interacting with STEAM: Charles Warrington, MicroChip, Anieanette Brown, Oregon Tradeswomen, Al McQuarters, Mt. Hood Community College, Aman Singh, City of Gresham.

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

Our Mission

To support, develop, and promote quality Science, Technology, Engineering, and Math (STEM) education for all students of 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 the region.

Our Vision

STEM education 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.

FRONTIER STEM HUB

SCIENCE TECHNOLOGY ENGINEERING MATH

The Frontier STEM Partnership serves Malheur County, a large geographic and rural region. The students and districts Frontier STEM serves often face challenges resulting from geographic isolation and limited availability of services, opportunities, and resources. The young people of Malheur County also face challenges associated with the second highest child poverty rate in the state at 37% compared to Oregon's average of 19%. Poverty can limit a child's social, educational, and personal development due to reduced access to opportunities.

The Frontier STEM Hub leverages the work of diverse partners and collective impact to create innovative solutions to overcome these challenges and reduce barriers.

To achieve their vision, 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 and support
3. Strengthen industry, higher education, 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

Key Initiatives

Chief Science Officers (CSOs)

This international student leadership program is supported by the National Science Foundation. In its second year in Malheur County, the program consists of 20 peer-elected youth from six area middle and high schools.

The goals of the CSO program are to:

- Increase student voice in STEM conversations
- Enrich student STEM culture and STEM career awareness
- Create a pipeline of diverse STEM leaders
- Enhance communication and collaboration between CSOs

CSOs at Leadership Training Institute in LaGrande.

FIRST LEGO League (FLL) Robotics

The number of robotics teams in Malheur County competing in FLL has increased from 2 teams in 2015/2016 to over 20 teams in 2018/2019. Through focused professional development, equipment lending programs, mini-grants for team and tournament registrations, and organized scrimmages for rookie teams to gain experience and confidence, the Frontier STEM Partnership worked to reduce barriers to entry for rural students, greatly increasing participation and STEM-learning opportunities.

Malheur Youth (MY) Health Science Day and Aviation STEM Field Days

Partnering with Oregon State University Extension, Treasure Valley Community College, Malheur ESD, the school districts of the county and numerous industry and community partners, Frontier STEM Hub has engaged the 7th and 8th graders of the Malheur County in interactive, hands-on, field days designed to increase students' knowledge, awareness, and aspirations toward STEM-related healthcare and aviation careers and pathways. For their efforts Frontier and their partners received two national awards: Excellence in Workforce Development Programming for MY Health Science Day and Excellence in Science, Technology, Engineering, and Math for MY Aviation STEM Field Day as awarded by the National Association of Extension 4-H Agents.

FRONTIER STEM HUB IMPACTS 2018-2019

Number of educators who participated in Hub PD or programs	Number of educator hours spent in Hub PD and programs	Projected number of students impacted by educator PD participation	Number of students who participated in Hub supported programs	Number of student hours in Hub supported programs	Number of teachers who participated in equipment loaning programs	Projected number of students who benefitted from equipment loaning programs
485	3,228	8,730	4,163	11,333	114	2,895

Nickie Shira, STEM & Innovation Coordinator | nickie.shira@malesd.org | 541-473-4865

5. GO-STEM

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" or "frontier."

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). There are pockets of industry primarily focused on food processing and packaging that form significant numbers of jobs in some counties. 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.

Programming

STEM Coaching

GO STEM is collaborating on a STEM coaching model with La Grande School District. STEM coaching aims to improve classroom delivery of STEM-related topics, help teachers effectively integrate NGSS and develop STEM Leaders in all

schools. GO STEM's designated science coach is working with 28 K-8 teachers. Teachers participate in grade level sessions working together to integrate hands-on STEM.

Project Impact
GO STEM participated in a collective evaluation project to determine the effectiveness of the Increase Time on Science in Elementary Schools and the STEM Coaching projects. The focus was to determine, at the conclusion of one year of professional development, if:

1. Teachers comfort and confidence with STEM increased
2. Were teachers committed to real-world STEM teaching and learning
3. Did teachers begin to embrace inquiry and real-world learning at the heart of their practice
4. Were teachers using problem-solving, critical thinking, hands-on and inquiry-based teaching methods

The outcomes of the project will be compiled, along with the other Hubs participating, into a document that can be shared with interested parties.

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 regional team completes an Action Plan to create STEM Awareness in their community.
In 2019:

- GO STEM has 24 CSOs and 8 advisors across 5 counties
    - Each CSO disperses information throughout their community and school
    - Male and female participation is roughly equal
- CSOs from GO STEM, Frontier and Columbia Gorge attended:
    - Leadership Institute (3-day event, hosted at EOU)
    - Spring Summit to showcase Action Plans
    - Regional trainings and networking events

Increase Time on Science in Elementary Schools
Professional development was offered to a cohort of teachers from summer 2018 – summer 2019. Twenty-Six teachers participated overall. Data collected at the conclusion of the PD showed teachers had increased confidence in teaching STEM, were able to integrate STEM into multiple subjects, were more comfortable implement NGSS and were using hands-on methods to teach science lessons.

Grant Awards

- **Career Connected Learning** - Oregon Community Foundation
    - Elementary, middle and high school programs are designed to empower and inspire students, create quality professional development for educators, link business and industry with education, support community and economic goals, and focus on equity and access for eastern Oregon students.
- **STEM Stays Here** - Oregon Community Foundation
    - Videos are created that highlight jobs and professions within the advanced manufacturing sector.
    - Address the "talent drain" in eastern Oregon and serve those farthest from the opportunities. This includes both students and teachers
    - Facilitate interaction and exploration of educational programming and business opportunities through events formed around videos.

Numbers

Within the 2018-2019 biennium:

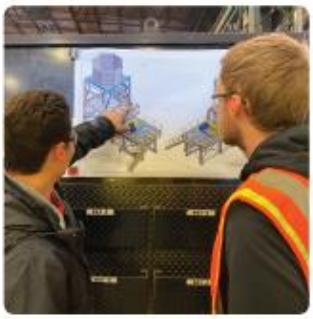
- 1,500 total hours of teacher training provided to 150 educators
- 6,000 total hours of student participation provided to students in out of school programs/events
- 350 total hours of participation donated from 70 industry professionals

6. LANE STEM

LaneSTEM
2018 - 2019 Legislative Report

Connected LANE COUNTY

elevate lane county



STUDENTS

16 school districts

1,136 secondary students participating

64 industry partners

EDUCATORS

10 educators

1,750 hours spent in industry

Externship Testimonial

A fascinating experience. I am glad this was a three-week placement. Like all experiences in new fields, my head was spinning for the first few days with the large number of new terms and acronyms, and it took a couple of weeks for everything to coalesce. The management team was supportive and positive.

Angie Wean

Mathways

The experience going to the Dorena Power plant was eye-opening to the students and me in terms of the amount of math necessary to the operation on a daily basis. The plant operator said that it took electrical engineering to really understand why algebra was so necessary in high school. This is a field that they are struggling to get qualified engineers to commit to the time required to become an electrical engineer, even though most training is paid training.

Creswell Math Teacher

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Computer Science & Digital Literacy

Increase in CTE programs from **1 to 12**

Launch of regional advisory board

Coder-in-Residence in **52 elementary classrooms**

12 new dual credit opportunities in high school

CTE Collaborations

3 New regional advisory boards launched together

Collaborated on hands-on learning day for middle school students

New Initiatives

Youth Equity Council

Youth Equity Council launched with six high schools

STEM Beyond School group formed

2018–2019 Leveraged Resources

Eugene | Oregon Community Foundation | Lane CTE | ies INSTITUTE OF EDUCATION SCIENCES | Oregon Forest Resources Institute

connectedlanecounty.org | @connectlane | info@connectedlanecounty.org

7. MID-VALLEY STEM-CTE HUB

MID-VALLEY STEM-CTE HUB 2018-19

History
The Mid-Valley STEM-CTE Hub continues to be an emerging STEM Hub that seeks to serve the communities of Linn and Benton counties in the central Willamette Valley.

In 2004, the Mid-Valley Partnership (MVP, later expanded with the addition of Lincoln County to become the Mid-Valley Mid-Coast Partnership, or MVMCP) was created to engage Linn and Benton county educational institutions, share resources, and collaborate on strategies for improving the performance of the region's students and teachers. Since its inception, the MVP has collaboratively considered and implemented a variety programmatic responses to factors that become impediments to student success and, more recently, the possibility of creating a STEM Hub for Linn and Benton counties gained the group's focused attention. To this end, the MVP convened a small committee to work on concept and purpose, identifying partners and Linn-Benton Community College as fiscal agent, and finally submitted an application to the Oregon Department of Education. The Mid-Valley STEM-CTE Hub was subsequently approved late 2017. Fortunately, some of the work of this new STEM Hub was already underway through two programs vital to the Mid-Valley region.

One of these programs is the Degree Partnership Program (DPP) that began in 1998 when Oregon State University (OSU) and Linn-Benton Community (LBCC) created the capacity for students to co-enroll in these two institutions, dynamically combining the educational resources of both colleges in pursuit of a four-year bachelor's degree, primarily in STEM programs such as computer science and engineering. Since that time, this DPP program grown in size to serve approximately 2,000 OSU/LBCC students annually and has been expanded to include other offerings such as supplemental Mechatronics instruction (a field of science that combines mechanical systems using robotics and computers) at LBCC for OSU engineering students.

The second if these programs is Pipeline, a business-driven program that has exponentially expanded the capacity and enrollment in K-12 and LBCC programs that lead to family wage careers in the region's expanding manufacturing and health care fields. Since its inception in 2014, Pipeline has played a critical role in filling almost 1,000 new jobs in these two business areas.

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

The Mid-Valley STEM-CTE Hub has gone through a couple of iterations since Oregon Department of Education approval in 2017.

Initially, our partners hired a full-time director and created a governance Board that was co-chaired by an industry-representative and a school district superintendent. This Board expanded and diversified its membership, worked to refine its strategic plans, and to clarify its value-added roles in the community. Initial thematic core initiatives were: 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.

Unfortunately, the Mid-Valley STEM-CTE Hub experienced challenges in managing a Board that grew in size to almost 30, found raising resources to match and augment State support more difficult than anticipated, and then lost its Director after a year. With the continuation of State support in question, the Mid-Valley STEM-CTE Hub took a "wait-and-see" approach before working to regroup.

One the reasons that the Mid-Valley STEM-CTE Hub experienced so many challenges in its first year is that much – but certainly not all – of the purpose of the Hub was already being served by the Pipeline program, creating competition for both resources and opportunities in our region. With this in mind, a "new" STEM-CTE Hub/Pipeline Collaborative has been created by bringing these two entities under a single Board of Directors, combining program capacity and resources, and bringing our program partners together with a more unified vision for what we can do together. At this moment, this new Board is working to hire a new Director who will lead this integrated program.

The program for this new Mid-Valley STEM-CTE Hub/Pipeline Collaborative incorporates the already successful work of Pipeline, including direct communications with schools, students, and their parents, in-school and summer programs at LBCC, and business visits for both students and teachers, the OSU/LBCC Degree Partnership Program, and adding professional development opportunities for teachers to broaden the STEM-CTE opportunities for our students.

8. NORTHWEST STEM HUB

2018-19 Legislative 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 Northwest STEM Hub, and culminating over the last biennium since becoming a designated emerging STEM Hub in 2017, serving Columbia, Clatsop, and Tillamook counties. Throughout 2018-19, the NW STEM Hub continues to build relationships with cross-sector partners in order to expand regional P-20 STEM and CTE programming and develop career connected learning opportunities for youth and educators.

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 $2,544,000 in STEM and CTE funding to the NWRESD's region to carry out its adopted mission, and countless more through in-kind contributions and sponsorship. The partners of the NW STEM Hub work collaboratively to develop and sustain dozens of opportunities for thousands of students. NW STEM Hub achievements include awareness and exposure activities, such as supporting the coordination of Clatsop County's Job and Career Fair and coordinating a National Manufacturing Day event with OMIC (Oregon Manufacturing and Innovation Center) in Columbia County. Other achievements include expanding STEM professional development for early learning service providers in partnership with the Northwest Early Learning Hub and CCR&R, along with partnering with the Oregon Science Project which offers learning facilitator and equity-based NGSS training to elementary educators. The biggest accomplishment to date

is the establishment of the regional Works programs in Clatsop, Columbia, and Tillamook counties, which offers paid internships and career connected learning opportunities in partnership with local industry. Throughout the 2018-19 school year, the Northwest STEM Hub has begun to develop a network of non-formal educators through supporting museum-based education and after school/out of school STEM programs within the regional public library systems. The NW STEM Hub has provided technical assistance the 13 school districts in the region to modernize and inject high wage/high demand STEM concepts into traditional CTE offerings. This comprehensive body of work is possible because Northwest STEM Hub has over seventy highly engaged, regional partners representing over sixty organizations who are deeply committed to the NW STEM Hub's work.

Data Points:

Our Hub is one of the Emerging STEM Hubs for the 2017-19 biennium and just began investing in STEM and CTE programs in 2018-19:

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 development, 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- 132 Total industry partner hosts 2019- 12 Total 2019 interns- 22

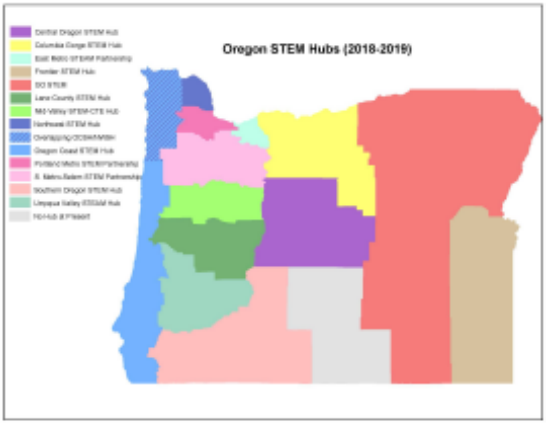
2. **Non-formal Education Network**
   Through partnerships with the Columbia River Maritime Museum and the St. Helens Public Library, the NW STEM Hub has begun to establish a non-formal educator network. The Columbia River Maritime Museum provides museum-based and in school STEM programs throughout region and beyond. The St Helens Public Library expanded out-of-school STEM programming and a STEM-based "Library of Things" for youth and community members to check out. These programs laid the foundation for replication and scaling these out of school opportunities into other regions.
   CRMM youth served 2018-19- 15,000 St Helens youth served 2018-19- 5,689

3. **National Manufacturing Day**
   In 2019, OMIC R&D in Scappoose, Oregon, hosted a National Manufacturing Day event, which provided engaging hands-on activities for youth and community members to learn more about regional companies and education opportunities at a world-class R&D facility. This event was possible through the collaboration with the NWRESD, the regional workforce investment board, local post-secondary partners, and local manufacturing companies.

   Total youth served: 350 Total school districts engaged: 12
   Total industry partners: 46

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 64 partners including 20 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

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

MISSION

Engage learners with STEM by leveraging local and regional resources and collaborating with diverse partners.

Student STEM Experiences

STEM Teacher Professional Development

Community Partnerships

OUR IMPACT

797 students engaged in OCSH facilitated or funded career-connected student STEM learning experiences.

451 educators engaged in career-connected STEM professional development impacting an estimated 15,785 students.

$274,399 in STEM investments secured for the coast.

Career Connected STEM Teacher Professional Development (PD) and Student Learning Experiences

This experience has changed the way I see science forever ~ Student

I learned more about what I want to do as an adult ~ Student

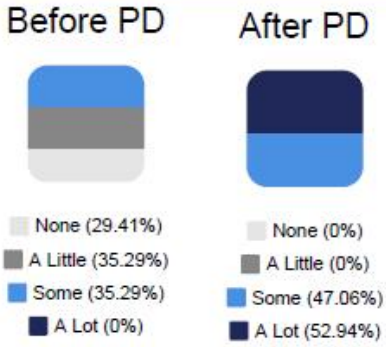
I am now using research-based science in my classroom on a daily basis ~ Teacher

The opportunity to work with marine researchers brings relevancy and engagement to the standards I teach ~ Teacher

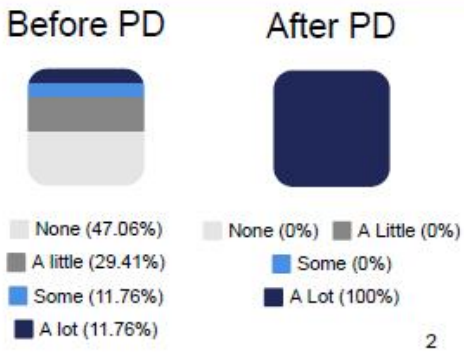
We now offer Engineering Fridays as part of our Creative Curriculum ~ Teacher

Being in the shoes of a scientist prepared me to use a theolodite, make a scientific presentation and sample by kayak ~ Student

My **Proficiency** in Facilitating STEM Experiences



My **Interest** in Providing STEM Learning Experiences



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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. We believe that high quality STEM education is critical for preparing our youth for a STEM-based economy and 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 by:

- Providing access to effective professional development for all types of educators
- Facilitating STEM school transformation to become STEM- or STEAM-focused
- Developing in-school/out-of-school partnerships to expand STEM learning opportunities for youth.
- Cultivating career-connected learning so that students and educators understand how STEM courses and careers are intertwined
- Supporting educators' use of evidence to create 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

SPOTLIGHT INITIATIVE: High School Science for All

Fifty-six districts across Oregon are piloting or implementing a common High School Science approach and curriculum designed to provide all students access to a rigorous, engaging, highly relevant, three-year learning pathway that better prepares them for post-secondary success. Development of

this curriculum began in 2011, when PMSP and Portland State University co-funded STEM Teachers on Special Assignment in our partner districts to support STEM education and identify barriers to success. Beaverton School District (BSD) reviewed course taking patterns and other data and discovered that students had hundreds of choices in how to earn their three years of science credit for graduation. Many students achieved their credit requirements through introductory science electives rather than a pathway that supported rigorous development of science literacy. As an example, only 11% of students were taking physics, a gateway into many STEM professions. Under this model, too many students, especially youth of color and youth qualifying for free or reduced lunch, were not accessing rigorous classes that would prepare them for college and career. Forest Grove School District saw similar patterns in their data. Seeking to change this dynamic, PMSP, BSD, FGSD, and PSU developed this 3-year science sequence aligned to the Next Generation Science Standards (NGSS): freshman physics, sophomore chemistry, and junior biology courses. In 2016, Portland Public Schools & Hillsboro School District joined this collaborative effort that includes summer professional development for high school science teachers implementing the curriculum. These four districts serve approximately 20% of the students in Oregon. Open source and continually refined curriculum and annual summer educator institutes have supported the expansion across the state to reach nearly one in three Oregon high school students.

IMPACTS THIS BIENNIUM

Impact Area	Value
Number of educators who participated in Hub PD or programs	1.145 educators
Number of educator hours spent in Hub PD and programs	13,882 educator hours
Project number of students impacted by educator PD participation	94,678 students impacted
Number of industry volunteers who participated in Hub activities	291 industry volunteers
Number of industry volunteer hours	594 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	27 teachers

PMSP Leveraged Funds (non-state funds):	Value
Grants and sponsorships (2017-2019)	$435,706
Partner investments in Hub initiatives (2017-2019)	$1,175,600
In-kind time and resources (2017-2019)	$397,490
Funding secured during this biennium for the future (2019-2023)	$992,521
Total	**$3,001,317**

11.SOUTHERN OREGON STEAM HUB

Southern Oregon STEAM Hub 2018-19

Background

The Southern Oregon STEAM Hub uses the collective impact approach serving formal and informal educational organizations in Josephine, Jackson and Klamath counties, including 13 school districts with 8 percent of Oregon's school-aged population.
Our mission infuses STEAM (Science, Technology, Engineering, Arts, and Mathematics) into every classroom and beyond. STEAM references both courses/academic disciplines and a "way of thinking/being" in the classroom. Scientific inquiry, creativity, 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 drive the outcomes necessary to thrive bringing economic prosperity to all!

Core strategies and Initiatives

Overarching all the strategies and initiatives below, and core strategy in and of itself, is to increase the diversity of participants in STEAM activities. Specifically, our focus is to increase the number of underserved/non-traditional educators and students who have access to and persist in STEAM 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 increases educator understanding of, and experience with how STEAM content manifests in STEAM fields. During the 2018-19 fiscal year we have supported world-class training delivered to our educators such as Best Practices in Math by Teacher's Development Group that provided training for 24 teachers from 8 school districts. We collaborated with the Umpqua STEAM Hub to maximize collective impact. Our follow-up support from Teacher's Development Group is also shared with the Umpqua STEAM Hub.

2. Youth Voice Initiative

During Spring 2019, 8 of our high schools voted in 20 Chief Science Officers. These CSOs attended a summer leadership seminar to learn about what it means to be a CSO, create their STEAM awareness strategic plans and meet with local industry. These

CSOs are 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.

3. Partnerships

Partnerships and collaboration are a vital component of sustainable programming and efforts to maximize impact and outcomes. Southern Oregon Steam Hub partnered with Boys and Girls Club, Camp Invention, Southern Oregon Air Academy, Talent Maker City, and Mazama Jr. STEM & M to conduct 34 weeks of after school and summer camps serving 797 students. Maintaining our partnerships is a priority and the SOESD currently lists over 40 active industry, business, community, and government agencies with whom we robustly collaborate on STEAM events, activities, and opportunities for educators, students, and their families.

4. Data-driven Decision Making

Southern Oregon STEAM Hub contracted with 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 is 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 by developing a universal evaluation plan to identify common and unique data elements across each of our various grant projects, develop appropriate evaluation instruments for project outcomes lacking available data elements, and collaborate with project staff to develop reports and Info-briefs for marketing/communication with stakeholders.

Anyone interested in our 2018-19 outcome data and other recently compiled reports may email karla_clark@soesd.k12.or.us

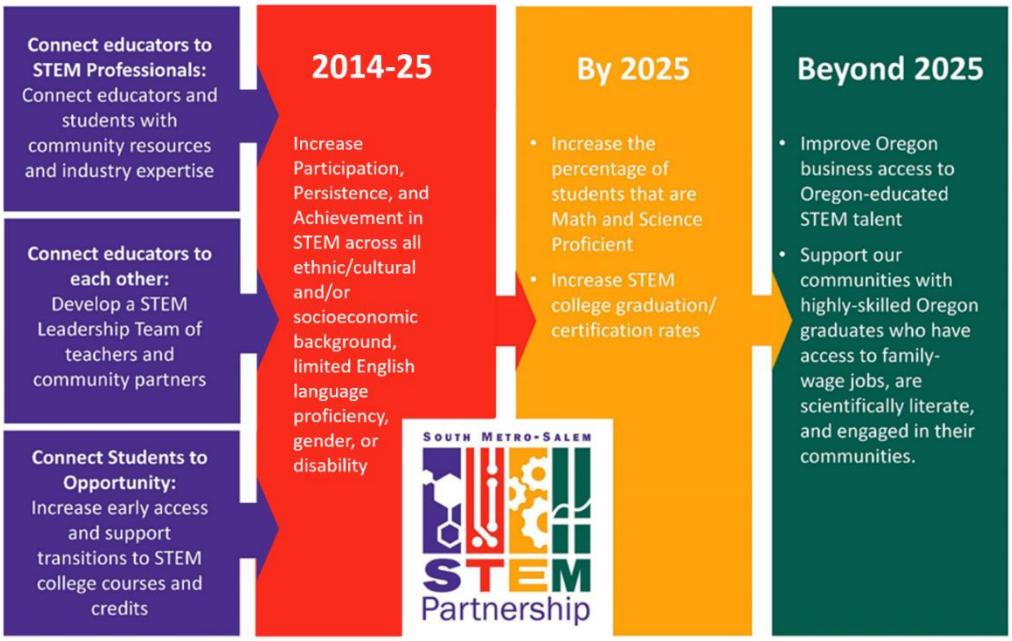
Major events/projects to highlight

1. Southern Oregon STEAM Hub Lending Library

The lending 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 education partners access the library free of charge. Teachers creating relevant, stimulating STEAM experiences for their students, and teachers with a passion for robotics, 3D printing, laser engraving, coding, science, engineering and aviation, will find an ever-expanding treasure trove of lessons, learning tools, and equipment. We will soon have 3 mobile maker spaces available for check out; These maker spaces will be deployed to each of our 3 counties starting in our most rural middle and elementary schools. Professional development is scheduled routinely for our educators to become familiar with and comfortable in their classroom using these lending library items.

12.SOUTH METRO-SALEM STEM PARTNERSHIP

The South Metro-Salem STEM STEM Partnership (SMSP) is a collaborative of community leaders, representing 17 K-12 school districts, 5 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 $3.3M of external funding ($130K in new dollars, FY2019), 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 in FY19:

   - **Statewide support for Oregon Connections, powered by Nepris, an online platform facilitating real-time virtual skills-based connections between educators and STEM industry volunteers.** 900 Oregon industry professionals and 2,100 educators statewide join a national network of 50,000 professionals. The SMS region had 4,890 students participate in more than 700 experiences with professionals in 2018-19.
   - Supported expansion of Oregon Connections into Umpqua and Frontier STEAM Hubs.
   - 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.
   - Established (and continue to maintain) STEMOregon.org as a central shared asset for STEM education in Oregon.

2. Connect educators to each other.

   Key Achievements in FY19:

   - **Continued support for local efforts of SMSP STEM Leadership Team (150 regional teacher-leaders)**
   - Renewed $130K funding to support development and delivery of standards-based NASA-related STEM professional development to >120 middle school teachers
   - Served as Oregon's nucleus for the Northwest Earth Space Science Pipeline collaborative with University of Washington; hosted Apollo Next Giant Leap Student Challenge for >100 middle and high school students (drone and robotics challenge) to commemorate 50th Anniversary of the moon landing. Collaborated with ODE Indian Education to host Dr. Jon Harrington, first Native American astronaut in space, as keynote. Planning 2020 ROADs on Mars Challenge.
   - Piloted model for Oregon Community Foundation Oracle Funds disbursement by Facilitating community matching grant in Dallas, OR. Developed Dallas Spark initiative, raising $16K ($8K locally, $8K matching from Oregon Community Foundation) and community awareness for project-based, student-centered education.
   - Collaborated with Willamette ESD to engage >145 teachers in summer externships.
   - Supported opportunities for SMS regional middle school teachers to engage in Math in Real Life project, in collaboration with teachers across Portland and East Metro STE(A)M Partnership regions.
   - Facilitated development of Computer Science and Digital Literacy K-12 Implementation Plans in pilot districts focused on expanding access to quality computer science to underserved students.

3. Connect students to post-secondary opportunity.

   Key Achievements:

   - **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% F/R lunch).

13.UMPQUA VALLEY STEM HUB

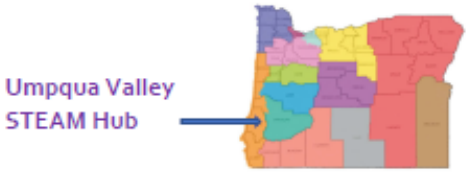
REPORT TO THE LEGISLATURE

2017-2019

INTRODUCTION

The mission of the Umpqua Valley STEAM Hub is to support and provide inspiring, engaging, authentic STEAM learning experiences for youth in Douglas County preparing them for future careers and a meaningful future.

The Umpqua Valley STEAM Hub serves the geographic area of Douglas County which includes 13 school districts meeting the educational needs of 14,000 students. 7 of the 13 districts serve less than four hundred students and 10 of 13 have 60% or more qualifying for Free/Reduced lunch. Our communities are considered rural with considerable distance between schools spread throughout the 5134 square miles of Douglas County.



STRATEGIC GOALS

1. Improve the quality of STEAM learning experiences PreK – 16+ both in and out of school by supporting educators through professional development and a resource lending library.
2. Expand opportunities for family and community engagement in STEAM Learning experiences to build community ownership for quality STEAM education.
3. Increase the number of students engaged in STEAM career connected learning experiences through awareness, exploration and preparation with support for future planning including post-secondary education

PROFESSIONAL DEVELOPMENT SUPPORT

Over 200 unduplicated educators representing all districts, private schools, home-school leaders, early childhood educators and non-profit youth serving organizations have been reached. Our signature event is the week long STEAM Institute held in August at Umpqua Community College offering multiple sessions with follow-up through the year. Emphasis is on project-based learning, argument-driven inquiry, and designing quality STEAM lessons with a priority for PreK and elementary

December 2019

RESOURCE LENDING LIBRARY

Over 175 local educators are registered users of the Resource Lending library which provides a vast collection of tools to support quality STEAM learning. www.umpquasteamhub.org At least 5750 students are estimated to have been impacted by the lending library resources.

COMMUNITY ENGAGEMENT

STEAM EXTRAVAGANZA
The annual STEAM Extravaganza presents a variety of 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 Umpqua Community College. In 2019, over 600 people of all ages participated in activities delivered by 45 community partners.

COMMUNICATION and STORY SHARING
Through the support of communication specialists, the stories of STEAM education in the Umpqua Valley are shared regularly through websites (www.dcpss.org www.brightfuturesumpqua.com), social media, The Partner's Post, television, radio and local newspapers.

STEAM CHAMPIONS CELEBRATION
The Umpqua Valley STEAM hub places a high value on building shared ownership for STEAM education with business/industry, educators, community leaders, non-profits, parents and students. In October, 95 champions from across our county were celebrated at a Partner's celebration.

BRIGHT FUTURES UMPQUA

The Bright Futures Umpqua initiative emphasizes the connection between quality STEAM education and future careers leading to personal and community vitality.

EXPANDING HORIZONS
SUMMER CAMP
Week long summer camps in a variety of STEAM career areas have impacted over 300 middle and high school students. Camps occur in locations across the county to facilitate engagement of typically underserved populations.

OREGON CONNECTIONS
Oregon Connections provides career connected learning through virtual field trips, "chats" with industry professionals both local and national, and access to digitized presentations where professionals share their skills and expertise to bring authentic learning opportunities to students. 70 educators have been trained, 700 students reached, 4 virtual field trips completed and 30 local sessions completed.

BRIGHTWORKS AMBASSADORS

Using the Chief Science Officer model develop through Arizona SciTech, we are supporting 3 projects in the Umpqua Valley to elevate the youth voice in STEAM education. Our Brightworks Ambassadors at Roseburg High School are leading elementary robotics clubs at 2 elementary schools reaching about 150 students. At the Boys & Girls Club, Friday night STEAM nights for teens are being led by Brightworks Ambassadors once a month. At Phoenix School, Brightworks Clubs are established in healthcare, Manufacturing/Design, The Trades and Culinary Arts.

HIGHER EDUCATION
COORDINATING COMMISSION