Oregon Coast Regional STEM Education Hub

Year 1 (Baseline) Report

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Purpose of the Evaluation

This is a formative evaluation for the first year of the Oregon Coast Regional STEM Hub (hereafter referred to as "STEM Hub"), which addresses the program's impact on schools, teachers, students, and the greater coastal Oregon community. This evaluation report has been designed to contribute to the annual report that will be communicated to the Department of Education to fulfill requirements of funding and this report might be used to secure future funding.

Data reported here is intended to be baseline data and focuses on three main groups associated with the STEM Hub: teachers, students, and community partners. Below, we present the professional development (PD) opportunities offered by the Oregon Coast Regional STEM Hub, teacher comfort in teaching STEM subjects and time to STEM allotted in the classroom, student engagement in STEM, and how community partners were utilized by STEM Hub participants.

Evaluation Design

Both quantitative and qualitative data was collected though a variety of evaluation tools, which were distributed to superintendents, administrators, teachers, and students. Superintendents and administrators were asked to complete an online survey at the end of the year that asked about STEM implementation and teacher PD opportunities occurring in their building.

Teachers were given a similar online survey but were also asked to report the amount of time spent teaching STEM subjects. At the end of each PD opportunity, all participants were given either a survey or a feedback form about the training they attended (i.e., what they liked, didn't like, and what they learned).

Students were also surveyed and asked to report their attitudes towards STEM subjects and interest in STEM careers. The project team collaborated to write the survey used by K-3 students, while 4th-12th grade students completed the S-STEM Survey (Friday Institute for Educational Innovation, 2012). All student surveys were distributed both online as well as in hard copy format with the expectation the majority of students would complete the survey online. However, only about one-third of the surveyed students completed the online version. Students who participated in STEM Hub sponsored events completed surveys about the experience, and these results are included in this report when available. While it was originally planned to use student standardized test scores to measure the impact the STEM Hub has on students, the evaluators were informed that data from Smarter Balanced tests will not be available until late summer 2015; therefore, those test results are not included in this report.

Any superintendent, administrator, or teacher who requested STEM Hub funds for

either a PD opportunity or to collaborate with community partners for student STEM activities were asked to complete an Authorization Form Survey. The data collected on this survey describes how the Oregon Coast Regional STEM Hub utilized community partners and the type of student population served (i.e., grade level, ESL learners, special education students, etc.). Copies of the surveys used to inform this evaluation are available upon request.

Results

Teacher Professional Development Opportunities. Over the course of the academic year, a variety of educators including both K-12 and out-of-school educators (Tables 1 and 2) were presented with a wide range of professional development (PD) activities (Table 3). For each PD activity, participants were asked to complete either a survey or a feedback form. In some cases, the surveys distributed were created by the organization (i.e., Private Eye) and collected to inform the training they offer. This means that similar data was not collected at each PD opportunity and that the quality of survey data was not to the evaluator's standards. However, some valuable information was found from the survey results.

Table 1. Educator population reached by STEM Hub professional development.

	Gender			Educator Type	
PD Opportunity	**Male**	**Female**	**Average Age**	**K-12**	**Out-of-school**
KidWind	8	18	39	24	3
Next Generation Science Standards	9	24	39	26	7
Private Eye	11	58	39	67	1
Picture Perfect Science Lessons	2	47	42	48	1
Spotlight on STEM Webinars	12	57	39	67	2
Vernier	3	6	40	8	1

Table 2. Ethnicity of STEM Hub PD participants.

	Ethnicity				
PD Opportunity	**White**	**Hispanic**	**Asian**	**Pacific Islander**	**Other**
KidWind	25	-	-	-	1
Next Generation Science Standards	30	-	-	-	3
Private Eye	62	2	1	-	4
Picture Perfect Science Lessons	42	4	-	-	3
Spotlight on STEM Webinars	64	-	1	1	4
Vernier	9	-	-	-	-

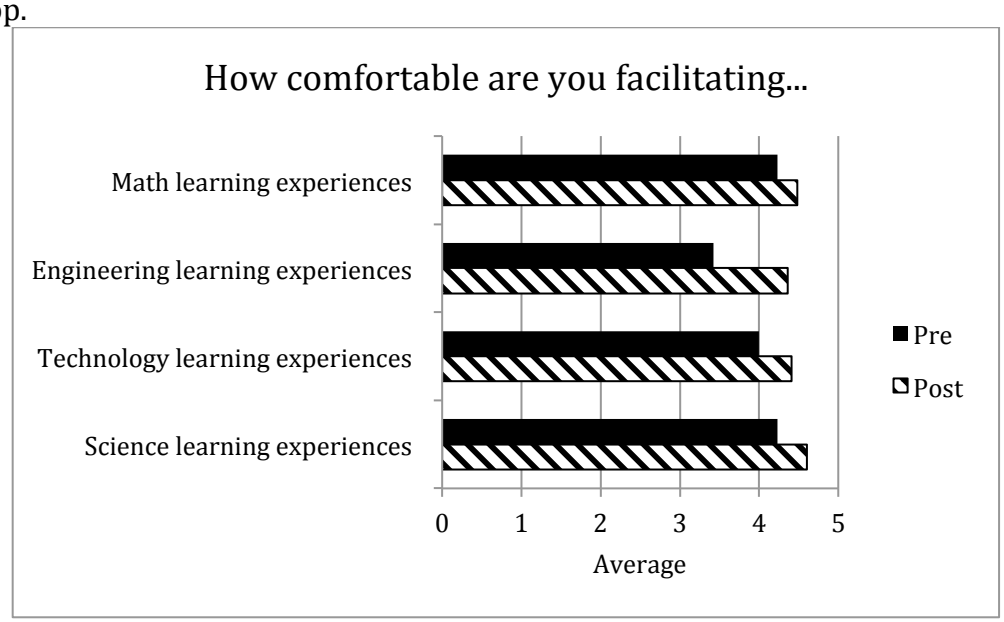
Table 3. PD activities offered by the Oregon Coast Regional STEM Hub.

Activity	**Number of attendees (Number of post-PD survey respondents)**
COASTALearning Symposium	325 (117)
ROV Workshop	28 (25)
KidWind Workshop	27 (22)
Next Generation Science Standards	33 (21)
StreamWebs	11 (10)
OCEP	16 (15)
Private Eye	66 (60)
Picture Perfect Science Lessons	46 (14)
Spotlight on STEM Webinars	57 (6)
Vernier	9 (4)
Engaging Girls in STEM	-
Afterschool STEM Curriculum	-
Summer: Project WILD, Climate Change, Program Evaluation	No data at this time

COASTALearning Symposium. Participants were asked to rate a series of questions on a five-point scale (1=poor to 5=excellent) about their experience at the Symposium. Generally, participants rated the Symposium highly, particularly *the content of the break-out sessions* (M = 4.06), *the quality of the presentations* (M = 3.99), and *the value to your personal knowledge and classroom application* (M = 3.76).

ROV Workshop. Participants surveyed found this training to be very useful (*M* = 4.84/5) and this showed in pre- to post-survey results. As seen in Figure 1, participants' comfort level to facilitate STEM subjects increased after the PD, especially their comfort in facilitating engineering experiences.

Figure 1. Change in comfort level facilitating STEM activities before and after ROV workshop.



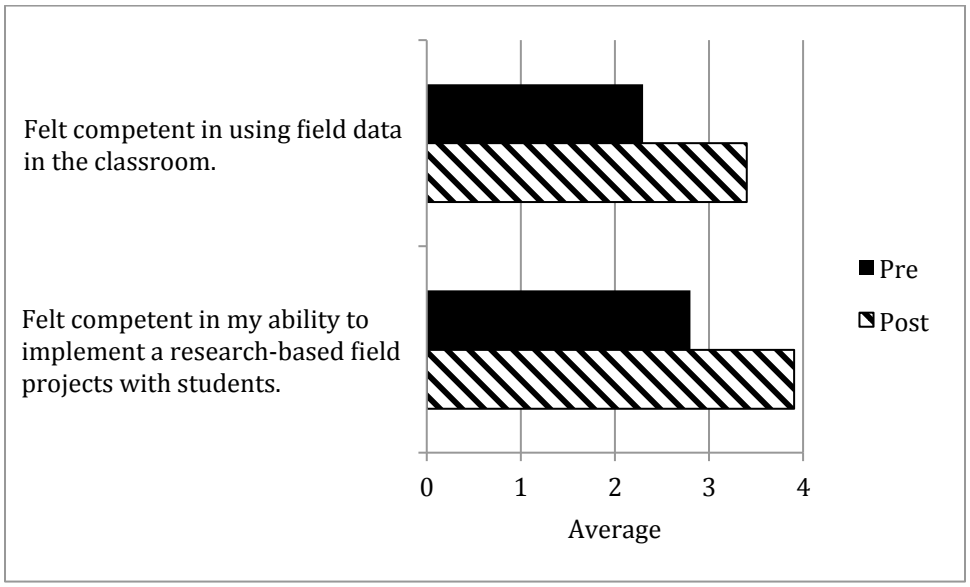
KidWind Workshop. Before the PD began, participants were asked, "What would you like to gain by attending this class?" Nine of the surveyed participants (45%) wanted to learn about the *resources available/lessons* (i.e., "Gain the resources and support to develop/use hands-on curriculum"). Six surveyed participants (30%) wanted to discover *implementation ideas* (i.e., "Another avenue to incorporate STEM lessons into my existing math and ELA curriculum") and five surveyed participants (25%) wanted to gain *knowledge about alternative energy*. Participants were also asked if they planned on using wind energy materials in their classrooms. On the pre-survey, 85.7% of participants said "yes," they would use these materials in the classroom, which increased to 93% on the post-survey. While some participants responded "maybe," zero participants reported "no," they would not use wind energy materials in their classroom.

Next Generation Science Standards. Participants in this workshop found *collaboration time*, *how to access the detailed information*, and *examples* particularly impactful and relevant. Forty-five percent (45%) of respondents identified "awareness" and the chance to "explore" the NGSS as strengths of the PD. Two participants commented that learning about the STEM Hub resources was a relevant part of the workshop.

StreamWebs. Participants rated the overall effectiveness of this workshop 3.5 (on a four-point scale), placing it between "good" and "excellent." Many reported they are likely (*M* = 3.8) to use the resources presented in the workshop in their classroom. Like the ROV workshop, the StreamWebs program increased participant comfort level, in this case using

research-based field projects and field data in the classroom (Figure 2). On the post-survey, participants were asked what they liked about the training. Five of the surveyed participants (38%) thought *hands-on learning* was the most effective aspect of the training, followed by the *presentations* (31%), and *resources available* (31%).

Figure 2. Change in competency level in using field projects and data before and after the StreamWebs PD.



OCEP (Oregon Coast Education Program). On a four-point scale (1=strongly disagree to 4=strongly agree), 73% of surveyed participants agreed and 20% strongly agreed that the workshop contributed to their confidence in using NGSS. The majority (67%) of surveyed participants intend to use activities from the workshop with their students. Like both the ROV and StreamWebs workshops, participants in OCEP agreed (47%) or strongly agreed (53%) that the workshop contributed positively to their confidence teaching about the local watershed. Participants also agreed (67%) or strongly agreed (27%) that the OCEP workshop contributed positively to their confidence teaching about how the ocean is connected to the local watershed. When asked what they liked about the workshop, the majority of participants (73%) appreciated the *hands-on activity/experiments*. *Networking* and *discussions* were also highlights of the workshop. Eighty-seven percent (87%) thought the length of the workshop was *just right* while 13% thought the workshop was *too short.*

Private Eye. On a four-point scale (1=needs improvement to 4=excellent), surveyed participants responded well to the content of the workshop (M = 3.88), the structure of the workshop (M = 3.61), and the value of the workshop (M = 3.88). Twenty-five participants (42%) valued the *practical ideas to directly incorporate into the classroom* (i.e., "Pushing the thought process of teachers and students."). Twenty-one participants (37%) identified *specific implementation plans* as their next steps from the workshop, including "teaching my students about scale and why using analogies help us think of form and function," and "bring[ing] in loupes with our plant unit and connecting it to writing." Suggestions for the

workshop include *reallocating time* (37%) to have "more time for applying/practicing" and *incorporating more movement in activities* (20%).

Picture Perfect Science Lessons. The majority of surveyed participants (57%) thought learning about the *5E Model* and *Discussions* were important ideas addressed in the workshop. For instance, one participant wrote, "Teaching students to have quality science discussions is important." Seven of the surveyed participants (47%) reported *engaging students in science* was an experience that had an impact on them personally with one participant saying, "Definitely the owl pellets. I've never seen/heard kids so excited about something in my life!" Like the Private Eye workshop, participants in the Picture Perfect workshop reported that this PD will help them *integrate subjects* in their classroom. Suggestions for the workshop include *obtaining materials beforehand* (36%) and "knowing you had to teach a lesson before the class would be great." Twenty-one percent (21%) of participants would prefer a *longer training*.

Spotlight on STEM Webinars and *Vernier.* Due to the way data was collected, these evaluators cannot decipher between the responses given for these two PD opportunities; therefore, the data is presented together. Participants were asked to rate a series of questions on a five-point scale (1=poor to 5=excellent) about their experience. Generally, participants rated these opportunities highly, including *the content of the workshop* (M = 4.36), *the quality of the presentations* (M = 4.36), and *the value to your personal knowledge and classroom application* (M = 4).

At the time this report was written, no other PD data was available for analysis. This is not to say that these programs were not completed. Overall, some recurring themes are present across PD opportunities available through the Oregon Coast Regional STEM Hub. Participants appreciate *hands-on learning* during PD and *resources available* or *obtaining resources or lesson plans* through the PD providers. At the end of multiple PD opportunities, participants reported gaining ideas for *implementation in the classroom* and the *integration of subjects*. One suggestion that arose multiple times, however, was that participants often feel that PD could be *offered longer*.

STEM Hub school districts were well represented at PD opportunities. While other STEM Hub events occurred, only the PD opportunities listed in Table 3 were considered for the purpose of this evaluation. Some opportunities (i.e., Picture Perfect) were offered twice, once in the northern region and once in the southern region of the STEM Hub. Other school districts, such as Knappa, Reynolds, and Corvallis, also participated in STEM Hub activities.

Teachers from twelve school districts attended PD opportunities (Table 4). Lincoln County teachers attended the highest number (13), and Seaside and Port Orford teachers attended the fewest number of PD opportunities (1). Over half of the students served by the STEM Hub receive free or reduced lunch, and 12% of the students served have special needs. These numbers are based on surveys of teachers requesting STEM Hub funds to participate in the PD. Some individuals requested funds for multiple opportunities, and this may impact the number of students served reported here. Educator demographic information was not collected as part of this evaluation; however, anecdotal evidence shows STEM Hub participation by both male and female educators.

Table 4. Students served by PD in each school district based on Authorization Form data.

District	Number of PDs[1]	Students served	Ethnic minority *(%)*	Special needs *(%)*	Female *(%)*	Free/ reduced lunch *(%)*
Astoria	3	423	120 *(28)*	45 *(11)*	186 *(44)*	216 *(51)*
Bandon	3	370	34 *(9)*	50 *(14)*	182 *(49)*	216 *(58)*
Coos Bay	6	2809	733 *(26)*	421 *(15)*	1503 *(54)*	2004 *(71)*
Lincoln County	13	878	268 *(31)*	86 *(10)*	440 *(50)*	573 *(65)*
Neah-Kah-Nie	4	850	99 *(12)*	58 *(7)*	391 *(46)*	577 *(68)*
North Bend	6	2307	122 *(5)*	226 *(10)*	641 *(28)*	862 *(37)*
Reedsport	4	96	5 *(5)*	12 *(13)*	42 *(44)*	54 *(56)*
Siuslaw	11	1261	273 *(22)*	135 *(11)*	631 *(50)*	835 *(60)*
Tillamook	8	186	55 *(30)*	34 *(18)*	86 *(46)*	82 *(44)*
Seaside	1	-	-	-	-	-
Port Orford	1	-	-	-	-	-
Warrenton	3	-	-	-	-	-
TOTALS:	**63**	**9180**	**1709**	**1067**	**4102**	**5419**

[1]Number of PDs are based on registration records

Access to Coaching or Mentoring. Based on the teachers who completed the Teacher Survey at the end of the academic year, the STEM Hub showed an increase in the number of teachers who reported having access to coaching or mentoring. For K-5th grade teachers, only 12 (24%) reported they had coaching or mentoring in the *three years prior* to the 2014-2015 school year and 22 teachers (46%) reported they had coaching or mentoring in the *current year.* This trend was similar for 6th-12th grade teachers, where 16 (33%) reported they had coaching or mentoring in the *three years prior* to the 2014-2015 school year and 20 teachers (48%) reported they had coaching or mentoring in the *current year.*

Establishing a PLC. The Teacher Survey asked participants about establishing Professional Learning Communities (PLCs) in their building. Again, this data only comes from teachers who completed the online survey. Seven K-5th grade teachers (14%) responded that their school did offer teacher study groups (such as PLCs) to discuss teaching and learning of STEM in the *three years prior* to the 2014-2015 school year. Only five K-5th grade teachers (10%) reported the presence of a PLC in the *current year.* Unlike the elementary teachers, there was an increase in the presence of PLCs (or similar school-based study groups) offered to the surveyed 6th-12th grade teachers. Twenty-two 6th-12th grade teachers (43%) responded that their school did offer teacher study groups to discuss teaching and learning of STEM content areas in the *three years prior* to the 2014-2015 school year. Over half (59%) of the surveyed 6th-12th grade teachers reported the presence of a PLC in the *current year.*

Time Spent on STEM PD. For both K-5th grade and 6th-12th grade teachers, there was no significant difference in the amount of time spent on STEM related professional development for any STEM subject area (*p* values above .061). K-5th grade teachers reported

having more science, engineering, and technology PD in the *current year* compared to the *three years prior* to the 2014-2015 academic year (Figure 3) while 6th-12th grade teachers reported having more math PD during the most recent school year (Figure 4).

Figure 3. Time spent on STEM-related PD for K-5th grade teachers.

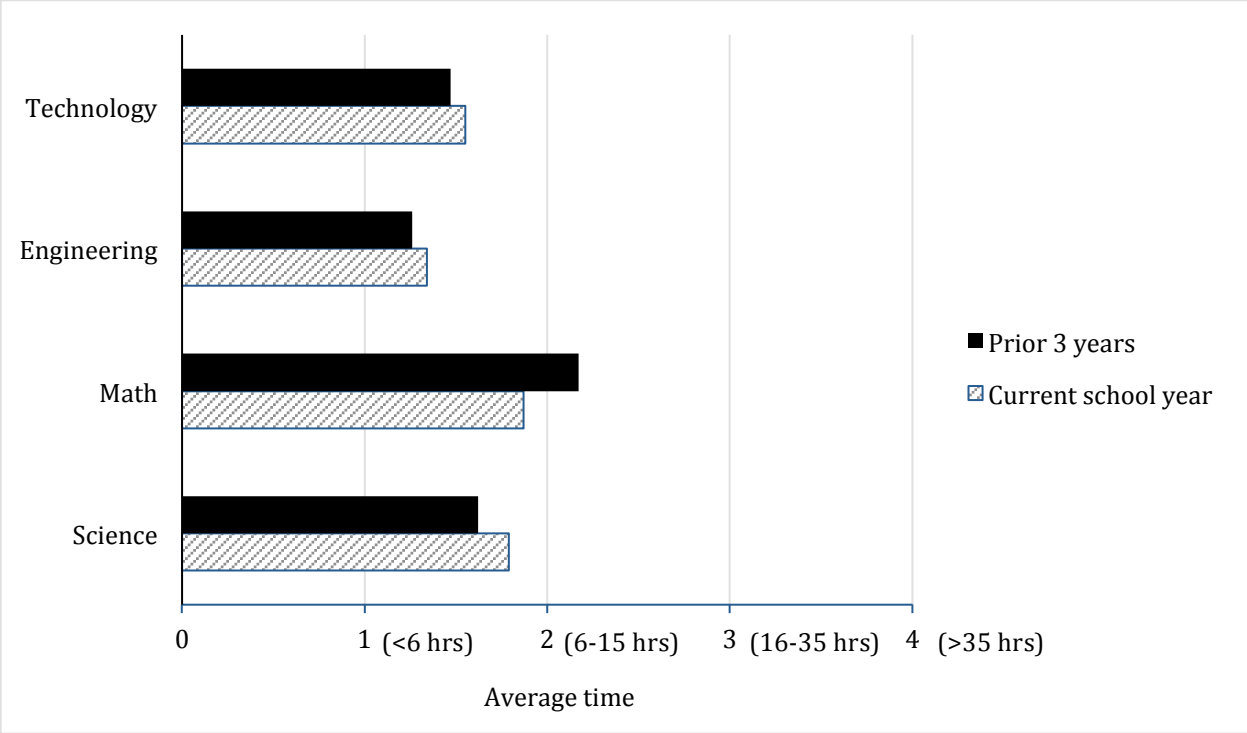
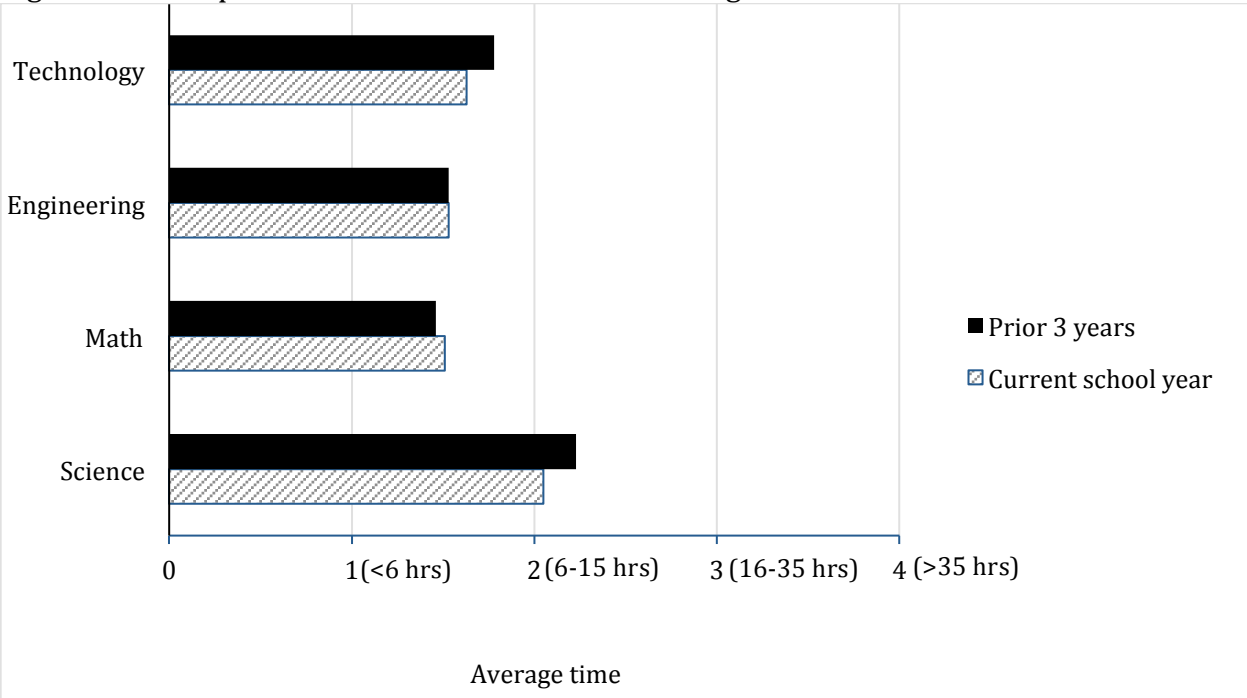


Figure 4. Time spent on STEM-related PD for 6th-12th grade teachers.



STEM Implementation. No data was collected to understand what STEM-based activities teachers actually implemented in the classroom. Data that shows a change in teacher practice in implementing STEM and Project Based Learning in the classroom also does not exist. What this evaluation report can speak to is how comfortable teachers are teaching STEM topics and how much time they allot to STEM subjects. According to the teachers who completed the Teacher Survey, K-5th grade teachers are most comfortable teaching mathematics and least comfortable teaching engineering. Sixth-12th grade teachers are also uncomfortable teaching engineering but are most comfortable teaching science (Table 5).

Table 5. Teachers' mean comfort level teaching STEM subjects[1].

	Grade level	
	K-5	**6-12**
Science	3.44	3.28
Technology	2.93	3.00
Engineering	2.62	2.56
Mathematics	3.76	2.89

[1]Means are measured on a four point scale from 1=very uncomfortable to 4=very comfortable

Of the 6th-12th grade teachers who taught science, 87% taught science all or most days every day of the week. Slightly fewer (83%) of 6th-12th grade math teachers taught math all or most days every day of the week. All 6th-12th grade teachers who taught engineering taught it every week, but three or fewer days each week, and 90% of 6th-12th grade technology teachers taught technology every week three or fewer days each week. The teachers who were surveyed indicated that they spent an average of 308 minutes a week teaching science (Table 6), which was the greatest amount of time spent on any of the STEM subjects. Most teachers (72%) identified themselves as science teachers.

Table 6. Average number of minutes spent teaching various subjects by 6th-12th grade teachers.

Subject	**Average time (minutes)**
Science	308
Math	122
Technology	110
Reading and Language Arts	83
Social Studies	51
Engineering	32

K-5th grade teachers were asked about the amount of time spent on math and science instruction. A majority of K-5th grade teachers (61%) who completed the survey taught science some weeks, but typically not every week. However, 91% of teachers reported teaching math all or most days every week of the year.

Student Engagement in STEM. Based on the Authorization Forms that teachers completed to receive STEM Hub funding for student activities, 7082 students were reached from eight school districts (Table 7).

Table 7. Student population reached by STEM Hub funding for student experiences.

District	Number of activities	Number of individuals requesting funding	Students served	Ethnic minority (%)	Special needs (%)	Female (%)	Free or reduced lunch (%)
Astoria	12	7	1706	303 *(18)*	222 *(13)*	801 *(47)*	1040 *(61)*
Bandon	3	2	42	10 *(24)*	1 *(2)*	15 *(36)*	23 *(55)*
Coos Bay	8	8	2068	212 *(10)*	165 *(8)*	1024 *(50)*	1468 *(71)*
Lincoln County	20	9	750	238 *(32)*	95 *(13)*	384 *(51)*	408 *(54)*
Neah-Kah-Nie	9	1	1230	227 *(18)*	125 *(10)*	614 *(50)*	92 *(75)*
North Bend	9	6	527	44 *(8)*	27 *(5)*	223 *(42)*	86 *(16)*
Reedsport	4	2	139	7 *(5)*	25 *(18)*	66 *(47)*	139 *(100)*
Siuslaw	4	4	620	110 *(18)*	55 *(9)*	310 *(50)*	450 *(73)*
TOTALS:	**69**	**39**	**7082**	**1152** ***(16)***	**715** ***(10)***	**3437** ***(49)***	**4535** ***(64)***

The student activities funded by the STEM Hub spanned grades K-12 with one experience for college students (Table 8). Excluding college, the largest percentage of students reached was in the 3rd-5th grade range (60%), and the smallest percentage (9%) in the 9th-12th grade range. Although grades 9-12 had one of the highest numbers of activities, it had one of the lowest number of students impacted. Some individuals requested funds for multiple activities, and this may impact the number of students served reported here.

Table 8. Grade levels reached by STEM Hub funding for student experiences.

Grade level	Number of activities	Number of students	% of total students[1]
K-2	11	3468	49
3-5	20	4259	60
6-8	25	2300	32
9-12	25	643	9
College	1	36	1

[1]Percentages > 100% because some of the activities reached multiple grade levels.

Student Attitudes about STEM. Students responded to statements assessing their attitudes towards STEM subjects and 21st Century Learning on a five-point scale. For 4th - 5th grade students, the lowest mean attitude was in science (*M* = 3.43), and the highest mean was in 21st Century Learning (*M* = 3.93). For 6th-12th grade students, the lowest mean attitude was in math (*M* = 3.35) and the highest mean attitude was in 21st Century Learning (*M* = 3.96). A mean above 3 indicates a positive attitude and less than 3 indicates a negative attitude. K-3rd grade students were asked if they are good at science, math, and engineering. Seventy-one percent (71%) of K-3rd grade students agreed that they are good at engineering. Only 68% of students agreed that they were good at math, and 63% agreed that they were good at science.

STEM Career Interest. For students in both upper elementary and high school, the mean interest in all the STEM careers was between 2 ("not so interested") and 3 ("interested") on a four-point scale. As shown in Table 9, the career that 6th-12th grade students reported being most interested in was engineering while 4th-5th grade students were most interested in veterinary work. Both these student age groups responded that a career in mathematics interested them the least. Students in grades K-3 reported the most interest in careers protecting the earth and the least interest in careers around making new medicines. Older students generally showed less interest in environmental careers, but more interest in creative and medical work. Within the K-3rd grade group, 65% of students agreed that they would like to be a scientist and only 53% agreed that they would like to be an engineer, even though they believe they are good at engineering (see above).

Table 9. Student STEM career interest by grade.

K-3	4-5	6-12
1. Protecting the Earth	1. Veterinary Work	1. Engineering
2. Design Machines	2. Biology and Zoology	2. Biology and Zoology
3. Create computer games	3. Engineering	3. Medicine
4. Invent things	4. Chemistry	4. Veterinary Work
5. Make new medicines	5. Environmental Work	5. Computer Science
	6. Computer Science	6. Medical Science
	7. Earth Science	7. Earth Science
	8. Energy	8. Chemistry
	9. Medicine	9. Environmental Work
	10. Physics	10. Physics
	11. Medical Science	11. Energy
	12. Mathematics	12. Mathematics

Careers in STEM Investigation (CSI) programs are career days offered at Hatfield Marine Science Center, one of the Oregon Coast STEM Hub partners. The program aims to expose students to STEM mentors and career options, and to inspire students to recognize the value in their current STEM coursework. Students responded to statements on a five-point scale, and means above three indicate agreement with the statement. Overall, students agreed that CSI helped them learn about career opportunities that they didn't know about previously (*M* = 3.82) and to see how the science and math courses they take in high school are connected to careers (*M* = 3.61). Students were generally neutral about

taking more math and science classes (*M* = 3.01), but somewhat agreed that they planned on working harder in the math and science classes they were currently taking (*M* = 3.38).

Girls in Engineering and Marine Science (GEMS) is a program offered to middle school girls and also takes place at Hatfield Marine Science Center. The program aims to empower young women to explore careers, gain skills, and meet mentors in marine science and engineering. Participants were asked to respond to statements on a five-point scale (1=strongly disagree to 5=strongly agree). In general, girls strongly agreed that they learned about careers in marine science that they did not know before (*M* = 4.59), and are thinking about going into a marine related career more than they were before (*M* = 4.00). Girls also strongly agreed that they planned to work harder in the math and science classes they were currently taking (*M* = 4.67).

Student STEM Activities Outside the Classroom. K-3rd grade students were asked if they had gone to a science, math, or engineering program outside of school hours. Students reported attending summer camp for science (38%) and math (30%). Forty-eight percent (48%) reported going to an after school program for science, 33% had been to an after school program for math, and 41% had been to an after school program for engineering. Forty-two percent (42%) of K-3rd grade students had participated in a science or engineering fair.

The Oregon Regional MATE ROV competition was an opportunity offered by the STEM Hub and included students, teachers, parents, and volunteers. Each of these groups completed a survey designed by MATE (Marine Advanced Technology Education), and the results were reported back to the regional team. Students rated their experience building and competing with their ROVs highly, with 81% of students describing it as good or excellent. Sixty-seven percent (67%) of students reported that they knew more about STEM careers, and 54% agreed that they were more interested in STEM careers after participating in the MATE ROV building process and challenge.

The following list includes additional student STEM activities that were offered by the STEM Hub but data to evaluate them is not available at the time of writing this report.

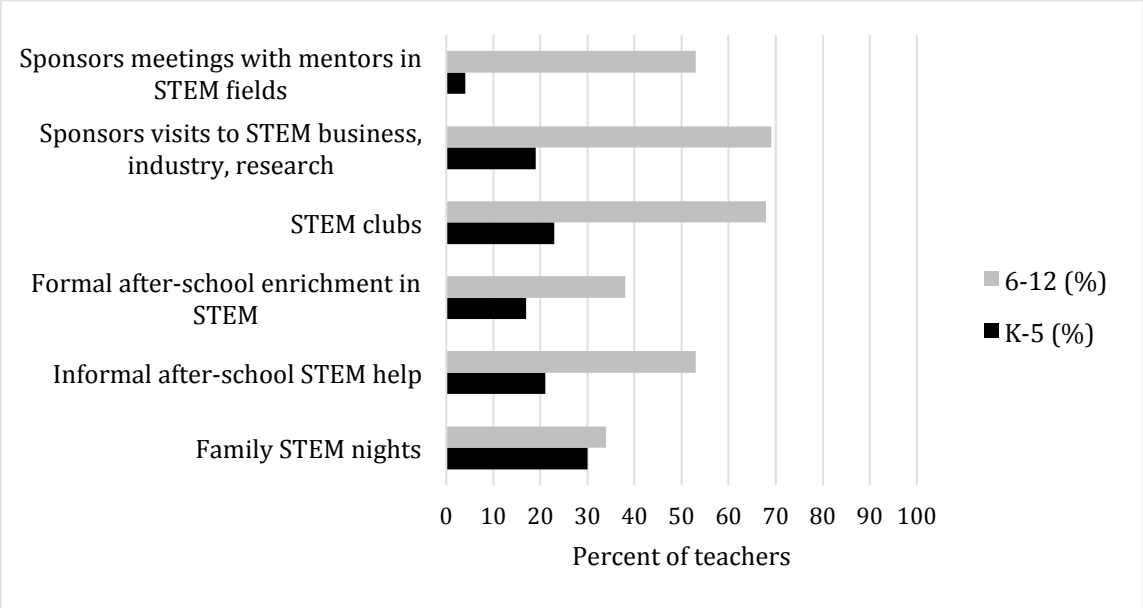
- Science fairs
- Marine Technology Summit
- Student fieldtrips
- STEM week activities
- Student STEMposium
- Student-Scientist partnerships
- Afterschool STEM programs
- COSEY camps
- Siuslaw Outdoor school/STEM camp

Teachers had the opportunity to use STEM Hub funds to implement STEM activities with students. Of the 69 student activities that reported a use of STEM Hub funds, 25% of the activities were continuations of existing activities, 40% were an expansion of an existing activity, and 35% were the implementation of a new program or activity.

Teachers were asked to report the types of STEM activities offered at their schools, which differed between elementary schools and middle and high schools (Figure 5). Middle

schools and high schools generally reported more outside-of-school STEM programming offered to students. While a similar percentage of teachers in the different grade levels reported offering family STEM nights (30% of K-5th grade teachers and 34% 6th-12th grade teachers), more 6th-12th grade teachers reported offering every other type of STEM activity. In fact, holding family STEM nights was the least offered activity at the 6th-12th grade level. Similar findings have been reported in other LCSD grant reports (i.e., 21st Century Afterschool Program and Project SEAL).

Figure 5. STEM activities offered at school based on grade level.



Middle and high school teachers were also asked additional questions about whether or not their schools participated in STEM competitions. Of the teachers surveyed, 72% reported participating in engineering competitions, 56% reported participating in science competitions, and 42% reported participating in math competitions. School and district information was not collected from these teachers, so it is not clear how equally distributed these activities are across the STEM Hub.

Community Involvement. The STEM Hub offered funding for attending professional development opportunities as well as facilitating student activities. Any STEM Hub participant who requested funds was asked to complete an Authorization Form Survey, which asked about the activity facilitated by the funding. Sixty-six people responded to the survey as using the funding for a professional development opportunity. Respondents were asked to list the community partners that were leveraged in each activity (Table 10).

Table 10. Community partners involved in the implementation of professional development using STEM Hub funding (number of times each partner was mentioned).

Western Lane Community Foundation	Oregon Institute of Marine Biology (2)
Siuslaw Salmon and Watershed Studies	PHS Booster Club
City of Coos Bay	Port of Port Orford
The College at Astoria	Bandon by the Sea Kiwanis Foundation
Center for Geography of Oregon	First Community Credit Union
Tillamook County Pioneer Museum	Mrs. Jean Soper in memory of Dr. William Soper
Oregon Public Broadcasting	Minute Cafe
Parents	Bandon Inn
MATE ROV (2)	Tri-County Plumbing
South Slough Estuary (5)	Bandon by the Sea Rotary
Oregon State University (2)	Clatsop Community College
OMSI	Vernier
Bandon Lions Club	University of Portland
Bulldog Industries Catering	Texas Instruments
KidWind	University of Oregon (2)
Oregon Environmental Education Association	Siuslaw School District Teachers (2)
Lincoln County School District	University of Washington
Private Eye (2)	Vigor Shipyards
Oregon Coast Aquarium (2)	MacArtney Underwater Technology
CEOAS Advanced Research Corp.	The Maritime Alliance Foundation
Business Oregon	Pacific Northwest Defense Coalition
Maritime Security Outlook	The Maritime Alliance

In addition to partnering with teachers to implement professional development, community individuals and organizations contributed funding (shown in Table 11). The following list includes community organizations that were leveraged to implement professional development opportunities partially funded by the STEM Hub. Dollar amounts are included when reported by the STEM Hub participant.

Table 11. Community partners that contributed funds to facilitate implementation of professional development.

$2700 grant from Western Lane Community Foundation
PHS Booster Club donation $350
North Bend HS facilities
Lincoln County School District
Oregon Youth Conservation Corps

Seventy of the respondents to the Authorization Form Survey requested funding for student activities. Table 12 shows the community partners that were involved in the reported student activities.

Table 12. Community partners involved in the implementation of student activities using STEM Hub funding (number of times each partner was mentioned).

Oregon Sea Grant (2)	REEF (3)
STEP Members (3)	SOS (Save Our Shorelines)
Oregon Department of Fish and Wildlife (2)	Oregon State University Hinsdale Wave Lab
Western Oregon University	NOAA
Bonneville Power Association	University of Oregon
Hatfield Marine Science Centers (6)	Carrie's Whale Watching
Professional Engineers Organization	Kidwind (3)
Boys and Girls Club	PUD (Public Utility District)
Chamber of Commerce	MATE ROV (2)
Betty Kay Charters	Coast Guard (4)
Elkton High School	Corvus Landing Farm
Marshfield High School	Astoria Middle School Parent's Club
Brookings-Harbor High School	Marine Discover Tours
Oakland High School	Oregon State University
Bulldog Industries Design	USCG
Bandon by the Sea Kiwanis Foundation (2)	US Department of Forestry (2)
First Community Credit Union (2)	Boys and Girls Club (2)
Mrs. Jean Soper (in memory of Dr. William Soper) (2)	Marine Reserves
Minute Café (2)	Oregon State Police
Bandon Inn (2)	Brandon Goodbuffalo
Tri-County Plumbing (2)	Cabela's Florence PTA
Bandon by the Sea Rotary (2)	John Barnett Indian Education
Bandon Lions (2)	Three Rivers Casino
Oregon Institute of Marine Biology (2)	Western Lane Ambulance
Julia Towsley	Siuslaw Valley Fire and Rescue
Food Roots (3)	Oregon Hatchery Research Center
Haystack Rock Awareness Program (2)	City of Yachats

For these student activities, a total of 345 community or industry members were reported to have participated. Many of the student activities were also implemented with both STEM Hub funds and additional funding from other sources. Additional partners who contributed funding to student activities are listed below (Table 13). Dollar amounts are included when reported by the STEM Hub participant.

Table 13. Community partners contributing additional funding for the student activities.

Astor Elementary School	Eddyville School
Oregon State University Wave lab	Millicoma School general budget fund
Donors Choose	Oregon Department of Education
Siletz Tribe	Community grant (Coos Bay)
School district funds (Coos Bay)	Newport Intermediate School Booster Club
North Bend School District	Outdoor school funds (Newport Intermediate School)
Wave lab	21st Century
Habitat for Humanity	Community outreach (Siuslaw Middle School)
Private donations	School fundraising in Siuslaw School District ($1250)
Astoria School District	Astoria Middle School Parent's Club
Waldport High School funds	Florence PTA ($1500)
Siletz grant	21st Century Community Learning Centers Grant ($5000)
Perkins funds	

Community members were also involved in other STEM Hub sponsored events such as the MATE ROV competition. Surveys were collected from 18 volunteers. Fifty percent (50%) of the volunteers at the event rated it as excellent, and the other 50% as good. All volunteers also agreed or strongly agreed that the experience was rewarding. Fifteen parents who were involved in the competition were also surveyed. Sixty percent (60%) of parents strongly agreed that their children knew more about STEM careers because of the ROV project, and 48% strongly agreed that their children were more interested in a STEM career.

Final Thoughts

In its first year, the STEM Hub offered at least 15 different professional development activities for teachers, and teachers from nine school districts used STEM Hub funds to participate in some of those opportunities. In general, PD opportunities were rated highly. Participants in the ROV workshop showed increased comfort levels in facilitating STEM activities after participating, and the StreamWebs PD participants reported increased feelings of competence using field data and project implementation after the workshop. Participants generally valued the resources and specific ideas presented in the workshops. The amount of time spent on STEM PD in the 2014-2015 academic year, however, was not significantly different from time spent on STEM PD in the prior three years. K-12th grade teachers did report increased access to coaching or mentoring in the current year compared with the prior three years. In the classroom, 6th-12th grade teachers spent the most time teaching science, while K-5th grade teachers reported teaching math more often than science.

In addition to professional development opportunities, the STEM Hub has offered several student experiences and provided funds for the implementation of student activities throughout the region. STEM Hub funds were used in eight school districts to implement student activities, 35% of which were new activities and 40% of which were expanding existing activities. Community partners are also being leveraged to participate

in and help fund both educator PD and student experiences. These student activities reached ethnic minorities, special needs students, females, and free and reduced lunch students. At individual schools, teachers reported that middle and high schools tend to have more STEM related activities offered than elementary schools.

Baseline data for student attitudes about the STEM fields and STEM career interest showed the most positive attitudes toward 21st Century Learning. Attitudes about science were lowest for K-5th grade students, and attitudes about math were lowest for 6th-12th grade students. This is consistent with 4th-12th grade students reporting mathematics as the STEM career in which they are the least interested. STEM careers related to environmental work were less interesting to older students; instead, these students were more interested in medical and engineering careers. Elementary teachers and students seem to differ in the amount of time spent on STEM subjects in class, the opportunities offered through the schools, student attitudes about STEM, STEM career interest, and teacher comfort level.

Recommendations

Create a clear evaluation plan. To help these (or future) evaluators, a clear evaluation plan needs to be in place. The evaluation plan should contain specific and measureable goals and objectives that will help drive the evaluation process, such as what information does and does not need to be collected as well as a timeline for data collection.

Edit existing surveys. (a.) Refine surveys so that they are geared towards the goals and objectives. These evaluators thought more data was collected than was needed and certain data was not consistently collected. (b.) Demographic and geographical information should be included on all surveys distributed to all audiences and consistently recorded during professional development opportunities. (c.) Due to data discrepancies, it's clear the Authorization Form Survey needs to be edited to ensure the survey can't be interpreted multiple ways. We also recommend having two Authorization Form Surveys, one for professional development and one for student experiences. (d.) All professional development opportunities should use the same instrument to measure what participants did/did not like about the experience and/or what they learned from the experience. This instrument can be added to external facilitators' feedback forms or surveys, as needed. This standardized instrument, like all evaluation tools, should minimize the use of yes/no questions. These evaluators recommend using Likert scale questions as often as possible.

Create a mentor teacher survey and feedback forms. As the members of the STEM Hub "on-the-ground," so to say, it's important to measure what the mentor teachers are gaining from this experience and how they are distributing STEM Hub information and resources in their school or district. We recommend collecting brief feedback forms from the mentor teachers a minimum of two times during the academic year (i.e., November and March) as well as a separate end-of-year survey. Particularly, these evaluators feel the mentor teachers might speak more to STEM Hub events (including PLCs) occurring in the school in a more clear and concise manner than other teachers.

Survey distribution. In order to increase the number of students completing the online

survey, we recommend that the student surveys be administered mid-academic year and at a time when statewide standardized testing is not occurring. We also recommend distributing the Authorization Form Survey to recipients when funds are released. Superintendent, administrator, and teacher surveys can still be administered at the end of the academic year, but distributing and collecting them before mid-May to increase the number of responses and not conflict with end-of-year schedules.

Differentiated professional development opportunities. K-5th grade teachers are spending more time teaching math than science, yet survey results show that these teachers believe they are receiving less math PD than in the prior three years. Students in 4th-12th grade had low interest in a career in mathematics; therefore, emphasis may not only need to be on offering PD, but also in how to incorporate the idea of different math careers. Students, especially those in upper elementary and high school, want to be engineers but engineering was the STEM content area teachers are least comfortable teaching. We recommend emphasizing engineering through approachable and easy to facilitate PD that simultaneously discusses careers in engineering. Comfort in teaching engineering was lowest for engineering for teachers of all grade levels. Therefore, professional development focused on facilitating engineering learning experiences as well as awareness of engineering careers is recommended for teachers in all grade levels. Moving forward, the Oregon Coast STEM Hub might use this information to offer different PD opportunities to different grade levels and emphasize engineering practices.