

Oregon Pre-engineering & Applied Science Investment Sub-Proposal Biennium from July 1, 2009 to June 30, 2011

Segment: Motivate

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Summary of Proposal:

Out-of-school activities will include engineering internships for students in grades 9-12, as well as summer engineering internships for middle and high school teachers in corporate settings. By 2020 an estimated 127 student interns will annually declare engineering majors as college freshmen and 370 educators who have completed internships will have influenced more than 55,000 students.

Vision Statement

Young people from all backgrounds who have been highly prepared by improved, in-class, activity-based engineering curriculum & out-of-school team-based activities, especially in low income schools, will have real-world, culminating internships during high school and will therefore be more likely to choose engineering majors in college, diversifying the field, building the number of engineers and leading many students out of poverty.

Teacher interns have a profound influence on students as they bring workplace experiences and new skills back to the classroom to make science, math and technology learning relevant. Their students are more likely to understand future opportunities and excel in the studies that will prepare them for engineering careers. With each teacher reaching over 150 students per year, there is a strong year-over-year cumulative effect.

Long-term Goals

The corporate technical community will develop a self-sustaining "culture of mentoring" of both high school students and teachers. Success is dependent upon the work that will be done in the classroom and through OST team-based activities.

Investment Description

Investment will be made in programs that:

- have a history of placing students and teachers in engineering internships that offer real-world problem-solving and open-ended learning with intensive interaction with practicing engineers
- have a history of outreach to underrepresented groups
- have a central organization through which activities can be coordinated, metrics can be collected and reported, and funds can be accounted for
- have existing infrastructures for recruiting and using volunteers, especially mentors
- offer internships of sufficient length, focus and type that the intern emerges able to articulate the impact his or her field of engineering has upon society
- require culminating events that cause the intern to reflect on and report to others the learning that has occurred

- require teacher interns to develop a plan to incorporate the teacher’s experiences into the classroom
- mentors are given training on how to effectively perform their role and are supported throughout the internship
- have a plan for making the program sustainable over time.

“Engineering” will include all aspects and subspecialties of computer science, mechanical engineering, industrial and manufacturing engineering, environmental engineering, materials science, nuclear engineering, transportation engineering, aerospace engineering, electrical engineering, chemical engineering, biotechnology, civil engineering, and any other engineering discipline approved by ETIC for an internship.

Up to 25% of the student and educator internships may take place in universities.

Private and Federal Support

Student and teacher internships: Industry will partially match from the beginning. By 2013, industry should begin picking up the full cost from corporate budgets. Federal funding is unlikely to play a role, except perhaps in university settings.

Results and Benefits

Short-term

Student internships. 75% of those who participate during the 2009-11 biennium will, upon graduating from high school, express their intention to declare technical majors in college.

Educator internships. For most, an internship is a teacher’s first work experience in business. To ensure that experience translates to improved classroom curriculum, each teacher will be required to complete a Career Related Learning Plan.

The year-over-year impact is cumulative as teachers make science, math and technology real for their students. Assuming each educator reaches 150-180 students per year, the following results can be anticipated during the 2009-2011 biennium.

	Number Educator Interns	Number Students Reached
2009	10	1,500-1,800
2010	10	3,000-3,600
2011	20	6,000-7,200
2012	20	9,000-10,800

Medium and long-term

Student internships. Due to better preparation in high schools, student satisfaction with the internship experience and representation of girls and minorities will increase over time, as will percentages of interns declaring technical majors (see metrics).

Educator internships. As teachers share their real-world experiences and encourage students to prepare for engineering careers, students seeking related internships can be expected to increase, as well as enrollment in related college programs. The projected number of engineering-related educator internships (see metrics forecast) will result in 55,500-66,600 students reached by 2020.

With both student and educator internships, participating companies will be actively engaged in the development of a pipeline essential to their future workforce.

Future Plan & Resources

Student internships. Mentoring companies will be coached from the beginning that the program is to be self-sustaining by 2020. Because of better in-school and out-of-school preparation, the interns will be highly productive on site, and employers will see the internships as valuable investments in their pipeline.

Educator internships. By the year 2013, it is expected that additional FTE will be required to solicit corporate involvement, match educators to internship opportunities and manage all aspects of delivery.

Measuring Results

Student internships. The success of student internships will be measured by 1) rate of growth in corporate participation; 2) student and mentor evaluations; and 3) interns choosing technical majors their freshman year in college.

Educator internships. Success with the educator internship program will be reflected in:

- *Level of business participation.* A new group of businesses will host a teacher intern each year. By 2020, 370 organizations will have provided workplace experiences that teachers will use to inspire and motivate their students.
- *Number of students reached* (described above)
- *Post- internship surveys* of both educators and their business mentors. The following outcomes for teachers are of special interest and will provide essential program feedback:
 - Increased knowledge of subject matter and its applications
 - New perspectives on how subject should be taught
 - Increased knowledge of careers and industry requirements
 - Renewed enthusiasm for teaching

NOTE: Reporting on teacher internships, Columbia University validates the “significant positive impact on their student’s interest and achievement in science.” (S. Silverstein, Ph.D., 2008)

**Proposed Investment and Private Support Forecast (\$0.220M)
STUDENT INTERNSHIPS ONLY**

		2009-2011 Biennium	2011-2013 Biennium
1			
2	Sources of funds		
3	Base budget for existing programs -- all sources except ETIC/OPAS, private, & federal support	\$ 600,000	\$ -
4	Proposed allocation from ETIC/OPAS budget (1)	\$ 220,000	\$ -
5	Expected private support (2)	\$ 100,000	\$ -
6	Expected federal support	\$ -	\$ -
7	Total (\$M)	\$ 920,000	\$ -
8	Personnel supported (FTE) by proposed ETIC/OPAS budget (3)		
9	Faculty	0.0	0.0
10	Administrative Staff (4)	0.0	0.0
11	Delivery Staff (5)	0.0	0.0
12	Total paid FTEs	0.0	0.0
13	Volunteers		
14	Individuals (6)	0	0
15	Volunteer hours (7)	0.0	0.0
16	Uses of ETIC/OPAS funds in line 4		
17	New facilities	\$ -	\$ -
18	Improvements to facilities	\$ -	\$ -
19	Equipment	\$ -	\$ -
20	Other one-time expenses	\$ -	\$ -
21	Faculty salaries & benefits	\$ -	\$ -
22	Administrative staff salary and benefits (4)	\$ 35,000	\$ -
23	Delivery staff salaries & benefits (5)	\$ 110,000	\$ -
24	Services & supplies	\$ 75,000	\$ -
25	Other	\$ -	\$ -
26	Total (1)	\$ 220,000	\$ -
	Instructions. (Replace with your own notes in the document you submit.)		
	(1) Totals on line 4 and line 26 should match.		
	(2) Consistent with ETIC Private Support Policy.		
	(3) FTE expressed as percent of full time over 2 years of biennium. For instance, a new full-time staff member hired on 7/1/10 would be counted as 0.5 in the 2009-11 biennium and 1.0 in the 2011-13 biennium because he/she joined half way through the first biennium.		
	(4) Staff who do not have direct contact with students		
	(5) Staff who work directly with students		
	(6) Expected number of individuals who will serve as unpaid volunteers.		
	(7) Volunteer hours over two year period		

**Proposed Investment and Private Support Forecast (\$.05M)
EDUCATOR INTERNSHIPS ONLY**

1		2009-2011 Biennium	2011-2013 Biennium
2	Sources of funds		
3	Base budget for existing programs -- all sources except ETIC/OPAS, private, & federal support	\$ 150,000	\$ -
4	Proposed allocation from ETIC/OPAS budget (1)	\$ 50,000	\$ -
5	Expected private support (2)	\$ 50,000	\$ -
6	Expected federal support	\$ -	\$ -
7	Total (\$M)	\$ 250,000	\$ -
8	Personnel supported (FTE) by proposed ETIC/OPAS budget		
9	Faculty	0.0	0.0
10	Administrative Staff (4)	0.0	0.0
11	Delivery Staff (5)	0.0	0.0
12	Total paid FTEs	0.0	0.0
13	Volunteers		
14	Individuals (6)	0	0
15	Volunteer hours (7)	0.0	0.0
16	Uses of ETIC/OPAS funds in line 4		
17	New facilities	\$ -	\$ -
18	Improvements to facilities	\$ -	\$ -
19	Equipment	\$ -	\$ -
20	Other one-time expenses	\$ -	\$ -
21	Faculty salaries & benefits (3)	\$ 40,500	\$ -
22	Administrative staff salary and benefits (4)	\$ 2,375	\$ -
23	Delivery staff salaries & benefits (5)	\$ 7,125	\$ -
24	Services & supplies	\$ -	\$ -
25	Other	\$ -	\$ -
26	Total (1)	\$ 50,000	\$ -
	(1) Totals on line 4 and line 26 should match.		
	(2) Consistent with ETIC Private Support Policy.		
	(3) Payroll & tax expenses for educator interns		
	(4) Staff who do not have direct contact with educators		
	(5) Staff who work directly with educators		
	(6) Expected number of individuals who will serve as unpaid volunteers.		
	(7) Volunteer hours over two year period		

Metrics Forecast (for programs covered by this sub-proposal):

	Actuals (1)		Projected (2)		
	AY07	AY09	AY11	AY13	AY20
Teachers (1)					
Teachers participating		10	20	30	50
Teacher contact hours (4)		1,800	3,600	5,400	9,000
Satisfaction of teachers participating (5)		9	9	9	9
(7)					
Counselors (2) N/A					
Counselors participating					
Counselor contact hours (4)					
Satisfaction of counselors participating (5)					
(7)					
Parents (3) N/A					
Parents participating					
Parent contact hours (4)					
Satisfaction of parents participating (5)					
(7)					
Students participating					
Students participating		100	100	125	300
Student contact hours (4)		32,000	32,000	40,000	96,000
Satisfaction of students participating (5)		9	9	9	9
Attitude of students regarding engineer & ap. sci. (6)		8	8	9	9
Percentage participation by girls and young women (8)		35	35	40	50
Percentage participation by under represented minorities (8)		12	18	20	25
Interns reporting technical majors as freshmen in college		75%	75%	80%	85%
Students choosing OUS schools		75%	75%	75%	75%
(7)					
Instructions (replace with your own notes in your proposal)					
(1) Indicate NA if program is such that teacher participation is not relevant.					
(2) Indicate NA if program is such that counselor participation is not relevant.					
(3) Indicate NA if program is such that parent participation is not relevant.					
(4) For example, 5 people participating for 3 hours would be 15 contact hours.					
(5) Based on satisfaction surveys of those participating on a ten-point scale.					
(6) Based on surveys of students before and after participating -- percent planning majoring in eng / ap. sci.					
(7) Add additional metrics as appropriate.					
(8) Percentages of girls & minorities participating will largely reflect success of recruitment into PLTW & competitions in the schools					