

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

**Segment:** Out-of-School Time (OST) Programs for Problem-Based Learning in Science, Technology, Engineering, and Mathematics (STEM)

**Contact Name:**

**Date of Submission:**

**Summary of Proposal:**

This proposal seeks to create a comprehensive framework and associated support to guide and to offer specific programs to deliver OST problem-based learning experiences in science and engineering for fourth through ninth grade students. This proposal is intended to attract and engage students from diverse backgrounds in a range of OST opportunities in order to prepare them for and retain them in STEM learning. The outcomes will be an increase in the number and diversity of students poised to continue in STEM coursework in high school and to consider careers in engineering and applied science fields.

**Vision Statement**

To have a positive and lasting impact on the OST learning opportunities and engagement of Oregon's fourth through ninth grade students and to assist their educational and career influencers in promoting the school success, STEM participation, and engineering and applied science career aspirations of these youth

**Long-Term Goals**

This proposal, as one element of a comprehensive statewide effort to create collaborative in-school and out-of-school learning experiences, has three long-term goals:

- Increase student interest in and motivation for further study in STEM and their explorations of and aspirations for engineering and applied science careers.
- Demonstrate transformative partnerships between classroom educators and their counterparts in out-of-school-time (OST) settings, through sustained collaborations to enhance and bridge STEM learning in OST and classroom settings.
- Enhance overall community support of and engagement in STEM education and workforce development throughout the state.

**Investment Description**

This proposal seeks investment to provide statewide coordination to guide and support statewide efforts to build greater participation in engineering and applied science careers by offering problem-based learning opportunities in STEM for students in grades four through nine. Work will be undertaken to refine the framework for the design and implementation programs. Investment in this proposal will also support the expansion of existing effective programs, as well as the development of new programs to address unmet needs, leverage new resources, and enhance statewide capacity. Projects and programs supported through this proposal should

demonstrate the package of five features that have been extracted from programs with research-based evidence to support their effectiveness (Building Engineering and Science Talent [BEST], 2004). The features, captured directly from the 2004 BEST Report, are:

- ***Defined outcomes*** drive the intervention and are successfully accomplished for the entire target population. Students and educational staff agree on goals and desired outcomes. Success is measured against intended results. Outcome data provide both quantitative and qualitative information. Disaggregated outcomes provide a basis for research and continuous improvement.
- ***Sustained commitment*** enables effective interventions to take hold, produce results and adapt to changing circumstances. Its components are proactive leadership, sufficient resources and steadfastness in the face of setbacks. The minimum conditions for assuring sustained commitment are continuity of funding and of support at the individual school and school district levels.
- ***Personalization*** acknowledges that the goal of intervention is the development of students as individuals. Student-centered teaching and learning methods are core approaches. Mentoring, tutoring and peer interaction are integral parts of the learning environment. Individual differences, uniqueness and diversity are recognized and honored.
- ***Challenging content*** provides the foundation of knowledge and skills that students master. Curriculum is clearly defined and understood. Content is related to real-world applications, goes beyond minimum competencies, and reflects local, state and national standards. Students understand the link between the rigor of the content they study and the career opportunities which await them later in life. Appropriate academic remediation is readily available.
- ***Engaged adults*** who believe in the potential of all students provide support, stimulate interest and create expectations that are fundamental to the intervention. Educators play multiple roles as teachers, coaches, mentors, tutors and counselors. Teachers develop and maintain quality interactions with students and each other. Active family support is sought and established.

Examples of existing, effective programs in STEM enrichment that might be expanded under this proposal include: Mathematics, Engineering, Science Achievement (MESA); Oregon Robotics Tournament and Outreach Program (ORTOP); and The Science & Math Investigative Learning Experiences (SMILE) Program.

### **Private and Federal Support**

## **Results and Benefits**

### *Participating youth will:*

- Become excited about, and build confidence in, their ability to successfully learn about STEM, excel in school, and pursue challenging careers;
- Learn about, develop and maintain positive attitudes about STEM learning, STEM career opportunities and paths to those careers;
- Learn in a supportive environment that provides a sense of community;
- Engage in meaningful STEM experiences and connect with mentors to learn about college and careers and to gain a vision for pursuing STEM majors and careers;
- Interact with engaged adults who will encourage the students' school participation and success and support their understanding of STEM content; and
- Persist and succeed in school and STEM learning, in formal and informal settings.

### *Participating STEM educators and volunteers will:*

- Cooperate with other project partners to provide in school and OST STEM activities and opportunities that are designed to connect to and reinforce one another;
- Collaborate with other project partners to expand opportunities for families to be involved in STEM learning at informal science institutions and other community settings; and
- Develop ongoing, beneficial interactions with other project partners to sustain comprehensive support for STEM learning and careers aspirations.

### *Families and community members will:*

- Experience lasting partnerships with STEM educators in OST and classroom settings; college and university faculty and students; and business and industry leaders and employees;
- Participate in OST STEM opportunities offered in a variety of venues; and
- Express enhanced capacity to support STEM education and career aspirations for youth.

## **Future Plans and Resources**

### **Measuring Results**

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**THINKING SPACE for Additions to the Proposal**

### **Long-Term Goals**

### **Investment Description**

### **Private and Federal Support**

### **Results and Benefits**

### **Future Plans and Resources**

## Measuring Results