Oregon University System **ISSUE BRIEF**

Oregon's Engineering and Applied Science "Pipeline"

ETIC pre-college programs that prepare today's and tomorrow's technology workforce

Creating a highly skilled, innovative workforce begins with nurturing the academic skills and aspirations of K-12 students. To support Oregon's need for high-wage, high-demand workers, Oregon's leaders in all sectors – government, legislature, industry, and education – have begun to purposefully "grow" the number of engineering and applied scientists through strong, targeted pre- and in-college programs for students in every part of the state. This is an important component of the mission of the Engineering and Technology Industry Council (ETIC): strengthen the academic preparation of K-12 students in the areas of engineering, computer science, and other applied sciences.

Pipeline Programs and Strategies

ETIC has developed and supports a number of K-12 strategies and programs that ensure a workforce of engineers and applied scientists for Oregon:

OPAS Initiative: The Oregon Pre-Engineering and Applied Sciences initiative, OPAS, is a statewide, cross-sector effort to address the shortage and lack of diversity in students successfully pursuing preparation for STEM[1] technical careers. This work began at a September 2005 statewide summit co-sponsored by the Oregon University System, the Oregon Department of Education, the Oregon Department of Community Colleges and Workforce Development, the Intel Foundation, and The Lemelson Foundation, and has since been developed and coordinated by a diverse steering committee and several working groups. To date, OPAS has:

Returns from OPAS Investments

- **Increase the opportunity for Oregonians to gain insight into technical careers.**
- **Add relevance and motivation to the learning of mathematics and science.**
- **Provide concrete examples and hands-on experiences, increasing the depth of understanding and retention of knowledge and skills.**
- **Complement other efforts to enhance mathematics and science education.**
- **Bring together best practices.**
- **Enhance STEM teaching skills of Oregon's teachers.**
- **Increase diversity of students pursuing degrees in engineering and applied science degrees.**

a. Channeled more than $754,000 of ETIC grant funding to 13 individual programs and projects serving K-14 students and educators statewide. These programs prepare students for high-school, college and workplace opportunities; undertake research on effective STEM curriculum approaches; and train teachers and provide materials for using effective programs and techniques.

b. Completed a year-long collaboration to determine where the greatest areas of need in STEM pre-college preparation intersect with the expertise and resources of the OPAS initiative; and are now actively engaged in:
Motivation: Enhancing the ability of STEM education programs to increase students' interest and knowledge of engineering and applied science opportunities for the purpose of pursuing technology-oriented careers;
Preparation: Increasing the use of improved teaching methods such as active learning, student inquiry, engineering problem solving, and creative teamwork; and
Success: Increasing the enrollment and successful completion of STEM courses by underrepresented populations across Oregon.

c. Convened more than 80 decision-makers in February 2007 to kick off the Network of Informal STEM Educators (NOISE), funded by an ETIC/OPAS grant, and organized by OMSI and the Business Education Compact. NOISE is an organized way of reaching the informal sector without the necessity for explicit connections to individual education organizations; and to help connect these organizations to the formal classroom.

[1] STEM: Science, Technology, Engineering and Mathematics

OPAS believes that the key to achieving a dramatic change in results within the PK-20 system is **providing real-world experiences and curriculum that is personally relevant to students**, delivered using methods that actively engage students.

Although launched within the context of a workforce shortfall in engineering and applied sciences, OPAS has chosen approaches to STEM education that will positively impact far more students than those who will ultimately choose careers in these technical fields. OPAS believes its work will have appeal and relevance to all students and help **develop Oregon's knowledge workforce**. Whether a student is at-risk, an academic star or elsewhere on the academic spectrum, STEM programs address the need for a solid academic grounding in math, science, and technology for all students.

GET REAL Explore Computer Science Initiative: This effort addresses the shortage in Oregon of computer scientists for all of Oregon's businesses and industries that need highly skilled technology workers. Beginning in fall 2005, the Computer Science Task Force – a cross-sector group of K-12 and university educators, industry members, and the university system – developed and implemented a strategic plan to address the decline in computer scientists that was precipitated by the "dot.com bust" and Oregon's recent recession. Through a statewide outreach campaign of a "teen friendly" publication and poster to students through their science and math teachers and a targeted GET REAL website, the effort is beginning to make headway in addressing in-state workforce shortages in computer science.

ORTOP Initiative: The Oregon Robotics Tournament and Outreach Programs, ORTOP, provides opportunities for students in grades 4 through 9 to experience the challenges and rewards of technical teamwork and gain insights into possible technical careers by building a robot, preparing a research presentation and competing in local and state tournaments. In 2006, two pilot programs addressed grades 1-3 and 9-12. Administered by OUS Industry Affairs and underwritten by a wide variety of Oregon companies, ORTOP has engaged teachers and volunteers across the state who coach teams and coordinate more than 20 tournaments in cities and towns, large and small across Oregon. The top state team competes nationally; some Oregon teams compete internationally. The business sector in Oregon provides financial and technical support to ORTOP, and gains by encouraging technical skill building, team building, innovation, creative risk-taking and leadership within their future workforce.

AeA Scholars Initiative: Administered by OUS, the AeA scholarship program provides Oregon high school seniors planning to study engineering, computer science, or related fields opportunities for four-year scholarships totaling $10,000, summer internships, and industry mentors. AeA scholars gain the financial help they need to attend and succeed high quality academic programs at any of the seven OUS institutions. Scholarships, internships and mentoring support are provided by the AeA Oregon Council, and a number of Oregon companies committed to supporting the technology skills pipeline in Oregon.

University and Nonprofit Initiatives: All of the OUS campuses and a number of nonprofit organizations operate and/or sponsor pre-college STEM enrichment programs supported by ETIC, OUS, campus, private, and federal resources that prepare students for college, both academically and through "learning the ropes" in advance of college, thereby ensuring success. These programs include: *MESA* at Portland State University; *SMILE* at Oregon State University; *Project Lead the Way* and *Teen Women in Science and Technology* at Oregon Institute of Technology; *Native American Adolescent Mentorship Program* at Eastern Oregon University; *Western Adventures in Math and Science* at Western Oregon University; *GK-12 Program* at the University of Oregon; *Academia Latina* at Southern Oregon University; and ASE internships at *Saturday Academy*, a nonprofit.