OPAS Steering Committee
ETIC Proposal Writing Task Force

Prepare Committee Subproposal: Pre-Engineering

Please, as authors of subproposals, review your proposals and respond (email to Jo) to these bullets in no more than one or two pages:

- Paragraph characterizing the elements of your exemplar program.
    - In Class programs should be offered in high schools statewide to provide students with increased opportunities to explore engineering and applied science careers. These classes should have rigorous academic content of value to college bound students; proven ability to serve a wide demographic range of students; and should be a complete system including proven curriculum, teacher development and supports, and objective standards and evaluation. One such program is Project Lead the Way which is currently offered in 2,300 schools across the US. OIT is currently leading the introduction of this program into Oregon.
- How is this program likely to deliver more well-prepared college freshman choosing engineering, CS, or materials science?
    - Per ODE data, only 5,000 of Oregon's 170,000 high school students take and "engineering and technology" course, no doubt in good measure because such a course is only offered in 33 of the more than 220 high schools in the State. The goal of this proposal is to establish a high quality pre-engineering class in three-fourths of Oregon's schools. This will create a dramatic increase in the number of college bound students who have had an engaging, hands-on exposure to engineering. For many students this will be formative with several benefits which are expected to increase the number of students choosing engineering careers: a. students will be prepared to make better college prep course choices while in high school; b. a larger number of students will choose engineering majors and will have the preparation to succeed; and c. students will enter college better prepared and with greater understanding of what to expect, leading to persistence and success in obtaining engineering degrees.
- How does this program achieve sustainable systemic change – that is, change that will outlive the OPAS committee structure and its solicitation and oversight of allocation of ETIC funding.
    - The proposal will provide start-up grants for schools to adopt an exemplar engineering curriculum and will support the associated teacher development. To qualify for these funds, schools will be required to agree to a sustainability plan. PLTW currently requires such a plan for a school to become a participant, and this agreement will be a useful starting point. It is expected that participating schools will build the on-going expenses into their base budgets just as they do for other academic programs.
- Delineate the balance of quantity, quality, and diversity

- The focus will be on increasing the quantity of well prepared students who choose to enroll in college engineering programs. The data above makes it apparent that few Oregon students currently have access to any pre-engineering experience, much less a program of the high national caliber of PLTW. In addition, this exemplar program has demonstrated the ability to effectively serve a broad range of ethnically diverse students and PLTW data indicates that their students are 5 times more likely than the national average to choose engineering or related majors. PLTW currently finds that women are underrepresented in their classes nationwide, as is true at the college level and they are working on approaches to improve this, which will be adopted in Oreogn. In addition, the communications program will be critical in making this opportunity visible to young women. Finally, we will be alert for opportunities to support schools with especially effective gender and diversity appeal and have targeted additional funds for additional start-up and support costs for such schools.

- Describe how to stage the growth in terms of geography, types of schools, target student audiences
  - OIT began introducing this exemplar program to Oregon in the 2004-05 academic year. By the time this proposal is funded it is projected that PLTW will have been introduced into 28 schools (18 high schools, 8 middle schools, 2 community colleges). This "phase 0" stage is providing experience with a variety of school environments (geography, school district size, school size, diversity of students, charter schools, community college collaborations, etc.). During the first two years of the proposed program, the selection of partner schools will be based on: a. recruiting committed schools and administrators who will commit to a plan for sustaining the program once introduced; b. schools with a diversity of students will given preferential consideration, and supplementary funds have been reserved for additional costs that are anticipated in Title 1 and other schools with highly diverse students; c. it will be attractive to recruit school "clusters" in which a high school and its feeder middle schools collaborate to offer an articulated program; and d. since this is conceived as a statewide program it will be critical during this first 2 years to pilot programs that can be deployed in rural and small school environments. OIT's is already gaining relevant experience in working in many of the above environments, which will provide a solid basis for the ramp-up enabled by this proposal. After the first 2 years, this proposal will focus on penetration: deploying the models and successes from the first 2 years in up to 75% of Oregon's high schools.

- The criteria question – to allow us to write the proposal "un-branded" to correctly follow procurement rules as a state agency – some ideas to consider:
  - The specific exemplar (PLTW) referred to above embodies selection criteria that should apply to any program considered for adoption under this proposal. All of the following are important and reflected in PLTW. It is worth noting that PLTW is the only high school engineering program profiled in both Rising Above the Gathering Storm and the NSF Science and Engineering Indicators 2008.
    - Track record of delivering a program recognized for excellence;
    - A system approach including curriculum, teacher development and support, and objective standards and evaluation;
    - Demonstrated success with diverse students, schools, and environments
    - Demonstrated impact on students' pursuit of engineering and applied science degrees

- Continuous improvement driven by objective data that identifies areas for improvement and directs effort to these area
- Quality control of the delivered program
- Commitment to sustainability once the program is established
- Objective evaluation of program quality and effectiveness
- The detailed testing and evaluation incorporated in PLTW is exceptionally thorough and will allow us to evaluate our success in Oregon.

The group brainstormed some metrics; this list is centered on Out of School Time (OST) High School programs, but may provide some inspiration for other programs and so is included here.

- Because "In Class" programs involve considerable contact hours, the opportunity for evaluation of learning outcomes, and the potential for longitudinal tracking of students' actual choice of field as they enter college, we expect to be able to determine the impact of this program on the core ETIC goal: increasing the number of qualified students who choose to pursue engineering and applied science degrees in college.