INTRODUCING PKAL REPORT ON REPORTS II, 2006

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Scientific and technological developments, creativity and innovation are essential to American competitiveness in the future. Previous calls to action have resulted in improvements to undergraduate science, technology, engineering and mathematics education. However, the tie between advances in science and economic competitiveness has become more evident to leaders in education, business and government across the country as evidenced by reports cited herein. These reports call on action related to changing circumstances and what will be required for the science and engineering workforce of 2015 or 2020.

Nearly fifty years ago, the nation reacted to the launching of Sputnik as an affront. The U.S. re-doubled its efforts and investments in training scientists and engineers and successfully responded to the Sputnik challenge. The public at that time understood and appreciated the need for investment in science. The dream of putting a man on the moon resulted in a transformed research and education community in America, leading to significant inventions and innovations that have had long-term economic impact on our nation and our world.

At the time of Sputnik, an engineer might have been prepared for work in a particular industry with the expectations of long-term employment. Today such career trajectory is not possible. As Thomas Friedman describes it, the world is now flat. We are awash in numbers, flooded with information. Ideas and data flow rapidly around the world. A global marketplace has developed and educational systems in many countries are producing trained scientists and engineers equipped to meet the demands of the 21st century. We have seen outsourcing of skilled jobs, restrictions on immigration of trained scientists and engineers. From a "go to" place and one of interest to others to go to, the U.S. is now facing a global climate where many countries are becoming increasingly competitive in scientific and technological fields.

Ensuring a strong science and engineering workforce in the U.S. has not remained a national focus. While more and more students are going to college in the U.S., the number of scientists and mathematicians being trained has not expanded, and in fact, the numbers have declined in many areas. Even though strides have been made in diversifying the composition of the science and engineering workforce, it still does not reflect society as a whole.

Preparing an adequate number of scientists and engineers is only part of the issue— how they are trained is critical. Given rapid developments in many fields, blurring boundaries between disciplines, improvements in instrumentation and developments in information technology, the educational process must be different. Students must be evaluated for skills and attributes that prepare them for life-long learning.

REPORT ON REPORTS II

In 2002, PKAL presented its first Report on Reports, analyzing a selection of influential reports issued from the mid-1980's that had shaped efforts to strengthen undergraduate learning environments in science, technology, engineering, and mathematics (STEM) over a seventeen year period. The audience for that 2002 publication was primarily leaders taking responsibility for the quality of STEM learning in the nation's colleges and universities; the intent was to provide ideas and recommendations to inform and advance their work, and to spotlight the potential for collective action.

This 2006 PKAL Report on Reports II is modeled after its predecessor. The intended audience is the entire community of stakeholders: those responsible for budgets, policies and programs that affect research and education in STEM fields at the national, state and local level; those responsible for the quality of STEM research and education in America's educational institutions; those potential employers of STEM graduates; and all citizens in a society in which science and technology have a significant impact on most aspects of our lives.

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Science, mathematics and engineering are strong preparation for careers in many fields. While our nation requires a robust science and engineering workforce, it is clear that education in the sciences (STEM) is preparation for a wide range of careers, as well as for leadership in the 21st century. As opposed to a society in which a small number of its citizens are trained scientists and engineers, we require a nation of learners that is interested in science and technology as a whole and in interesting students in the study of science and mathematics.

Corporate leaders are calling for more scientists and engineers. Higher education has invested in facilities and faculty. Business and higher education are forming partnerships aimed at improving K-12 and undergraduate training of scientists and engineers. Business and higher education are also calling on the third partner— government— to play its essential role in shaping the nation's future. The keys to economic competitiveness for that future will be adaptability, creativity and innovation and they require a significant, coordinated effort by business, education and government.

We need bold plans and mechanisms to accomplish what is called for in the summarized reports These efforts will require commitment from each of the partners and national leadership. On the surface, this should be easy. We find here a remarkable consistency. All speak about the urgency of the challenge; each articulates a vision and presents recommendations and approaches for one or more of the stakeholder communities. The intent of this *2006 PKAL Reports on Reports II* is to document the growing sense of urgency related to the nation's capacity to remain a nation of innovators, become a nation of learners, offer all citizens the opportunity for a full and productive life, and sustain America's economic competitiveness in our increasingly "flat world." ■