

AC 2007-158: ENGINEERING FOR THE AMERICAS: AN EXAMPLE FROM TODAY

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ENGINEERING FOR THE AMERICAS (EftA): *An Example from Today*

Abstract

The challenge of economic development is acute in Latin America. The EU, Asia, India, and others have emerged as economic powers, arriving swiftly and noticeably into the world marketplace and challenging longstanding principles including the balance of power. As a region, Latin America risks being left behind if governments, industry, and the people do not unite to create a sustainable, compelling offering in today's knowledge-based economy.

Engineering for the Americas is a broad collaboration of government, industry, academia, and civil society. Hosted by the Organization of American States, EftA is working to fulfill the Minister's mandate in the Lima Declaration of November 2004 wherein engineering was identified as a priority for countries to prepare a qualified, credentialed workforce for the new millennium. By working together, EftA has established both impact on the ground and political will in support of engineering and quality assurance as key levels of economic growth.

This talk will provide detail on the Engineering for the Americas initiative and the latest information on opportunities for you to get involved.

Overview

The belief that Engineering has a significant role to play in broadly enabling national, regional, hemispheric, and even global competitiveness is now an accepted premise of the vocation. The global market that now exists will continue to reward cultures that innovate, are open, and develop flexible policies, processes, and priorities. Today we see universities and others in higher education throughout the Americas actively seeking to understand the impacts of globalization and apply those understandings to classroom experiences and reform of curriculum.

The *Engineering for the Americas* initiative has emerged as a thought leader in this space over the past several years. The combination of faculty, collaborating with industry to integrate real-world needs and improve competitiveness of graduates, with Ministerial involvement, with the political mandate expressed in the Lima Declaration (2004)[1] and the Declaration of Mar del Plata (2005)[2], has produced a robust dialogue and comprehensive interaction.

Recently, *Engineering for the Americas* leadership adopted a three-pronged strategy going forward, designed to facilitate the entire engineering education ecosystem through collaborative projects and jointly seeking funding sources. This strategy calls for the following foci:

- Education enhancement and curriculum improvement – catalyzing interests around improving the classroom experience, integrating globalization topics and opportunities, and defining learning outcomes
- Quality Assurance and Accreditation – verifying the education process according to internationally recognized standards.

- Job Creation – creating an effective link to Industry from throughout the region on behalf of developing meaningful mechanisms of exchange for both faculty and students. Upon graduation, improve the applicability and competitiveness of university graduates.

Concrete projects and collaborations have already commenced. In October 2006 during the Global Colloquium on Engineering Education held in Rio de Janeiro, a Memorandum of Understanding was signed that greatly expanded EftA partnerships and effective reach into the engineering education processes of the Americas. Together with ASIBEI, LACCEI, IFEEES, ISTECS, ASEE, and OAS, *Engineering for the Americas* agreed to leverage activities and seek mutual benefit in improving the state of engineering and engineering education in the region.

For example, through partnership with LACCEI and INTEC, EftA helped develop a joint proposal to the InterAmerican Development Bank's Regional Public Good solicitation wherein the countries of Panama, Jamaica, and the Dominican Republic committed to embark on the creation of a regional engineering accreditation system in the Caribbean. This \$1.3M grant request is still under consideration at IDB, but serves to illustrate activities and opportunities that are resulting from EftA and the scope of institutional interaction we seek.

The remainder of this paper describes the motivations for *Engineering for the Americas*, the needs and objectives, and the evolution of EftA over time.

Introduction

Socio-economic development, particularly for developing countries can be effectively stimulated by building the technical capacity of their workforce, through quality engineering education programs. A competent technical workforce base can then provide several paths to economic development: attraction of technically oriented multi-national companies, who can invest effectively in the developing country once there is a cadre of qualified local employees available; effective utilization of public sector funds, and providing a legacy of appropriate infrastructure projects and technically competent people to operate and maintain them; and small business startups by technically competent entrepreneurs.

Capacity building can be defined as follows:

Capacity building is a dedication to the strengthening of economies, governments, institutions and individuals through education, training, mentoring, and the infusion of resources. Capacity building aims at developing secure, stable, and sustainable structures, systems and organizations, with a particular emphasis on using motivation and inspiration for people to improve their lives.

In the global economy of the 21st Century, engineers play a key role in overall economic development for countries and regions. In the well developed countries, the role of the engineer is well understood and utilized. In much of the developing world, however, the available pool of engineering talent is typically below critical mass – and economic development and even important basic societal needs that rely on engineering – such as clean water supply and sanitation – lack the technical talent to address them.

Technical capacity building efforts aim at developing a sufficient pool of well educated and certified engineering graduates in developing countries to effect three desirable outcomes[3]:

- Technical capability is needed for developing countries to engage effectively in the global economy; foreign direct investment, international trade, mobility of engineers, and the flow of work to countries with cost-effective talent will result.
- Indigenous science and technology capacity is needed to ensure that public sector funds are utilized effectively and efficiently and targeted to solve relevant local needs, Education, Health, Infrastructure, all of which can contribute to address the UN's Millennium Development Goals including poverty reduction, safe water and sanitation, etc.
- In order to stimulate highly-qualified-highly paid job creation in developing countries, a technical workforce pool is needed, made up of people who are specifically educated and prepared to engage in technologically based entrepreneurial startup efforts that meet local needs.

What is needed?

First and foremost, a large enough pool of high quality, accredited engineering graduates is needed in the continent so that the good results listed above can be realized.

It must be recognized that there will be some leakage of these graduates to jobs in the most developed countries, but many will choose to stay where family ties and native country culture provide a comfortable environment. For those graduates to stay, the basic need is the creation of quality jobs in their home countries. This is a chicken-and-egg issue. Increased demand for engineers will result only when there is a sufficient pool of well qualified graduates to attract foreign direct investment, multinational corporation operations, offshore outsourcing from developed countries, and technological entrepreneurial startups. Developing country planners and government officials must pursue effective economic development and job generation strategies in parallel with making the needed investments to enhance the quality and quantity of engineering graduates.

Engineering education should include significant coverage of entrepreneurship – how to start, operate, and grow a small business. Engineering graduates should be equipped to take a path of creating jobs rather than seeking one if they wish to do so. As described by the US National Academy of Engineers in the seminal *Engineer 2020* report, the engineers of the future will need a new set of skills to compete, some going far beyond traditional excellence in analytics to include teamwork, communications, business management, and a host of non-traditional engineering abilities[4].

As technology based economies grow, particularly in developing countries, one important source of top talent – in addition to new engineering graduates – is the return of previous emigrants from the diaspora. Several countries that are developing well have benefited from the return of

former citizens who see new opportunities in their home countries, and bring back foreign experience and network contacts to the benefit of their home countries.

In addition to increasing the number and quality of engineering graduates, and pursuing strategies to have quality local jobs available, developing countries need mechanisms to apply research and development results from local universities and companies for economic gain. Such mechanisms as incubators and small business development financing are needed in the mix.

Engineering for the Americas

The idea of Engineering for the Americas is the result of year of dialogue, experimentation, and bridge building around the investments in human capital needed to compete – as people, companies, or nations [5, 6].

This initiative, being carried out by multiple stakeholders is focused on developing plans for enhancing engineering education and practice throughout the continent. The OAS Ministers of Science and Technology issued a mandate in the Lima Declaration in support of this capacity building effort at their meeting in Lima, Peru in November, 2004.

A subsequent symposium held in Lima at the end of November 2005 attracted over 200 participants from the corporate sector, universities, national governments, professional associations, and civil society organizations, from throughout the hemisphere. Funding was provided by the U.S. Trade and Development Agency and several corporations from across the Americas, and was used to support attendance by over 100 of the participants.

Results included defining the needs of the sector, steps necessary to enhance and ensure the quality of engineering education, and country-level financing and planning of capacity building efforts. A follow up meeting was held in Puerto Rico in January of 2006 and a Provisional Executive Committee and several action oriented sub-committees have been set up to pursue the recommendations from the November 2005 symposium.

Today, Engineering for the Americas represents a partnership of local governments, civil society, and the productive sector committed to the creation of sustainable economic, social, and human development through investments in engineering education, quality assurance, and technical capacity building toward establishing an environment of mobility, technology-based enterprise, and enhanced trade and sustainable opportunity throughout the Americas.

Our response to globalization must be considered, strategic, aligned, and focused on absolute inclusion and the maximization of people's talent and creative abilities [7]. Attention to gender issues and the inclusion of women is especially important as the gender gap persists [8] and we can no longer afford to have half of our human resources unable to participate and contribute to growth.

Engineering for the Americas Goals

Engineering for the Americas mission and vision center on engineering as an economic and social development engine wherein quality assurance and accreditation are essential prerequisites for participation in the global economy.

Enabling innovation through technology-based growth demands investment in people, technical and engineering education, and systemic reform. This will lead to portable credentials and the mobility of both people and work essential to national competitiveness in today's knowledge-based economy and vital to future economic, social, and human development throughout the Americas.

Engineering for the Americas goals are to:

- Enhance the effectiveness of members and member organizations through the leverage of mutual resources, alignment of member community interests, and the advantage of creating a unified strategy for hemispheric growth.
- Convene top level Government authorities in an ongoing series of discussions to ensure sustained commitment to the mandate of the Lima Declaration and their intent to foster growth through engineering education initiatives.
- Facilitate a clear understanding among university and governmental leaders of the importance of effective systems of quality assurance and accreditation in engineering as enablers of foreign investment, multinational engagement, new value creation and national competitiveness.
- Involve Industry in actively shaping partnerships that invest in systemic engineering education reforms and the realization of harmonized systems of quality assurance as a fundamental basis for both hemispheric progress and their own future business success.
- Foster a broad dialogue on Innovation that addresses research as an integral part of quality education and facilitates an expanded capacity for inquiry, especially in the applied sciences, as an essential ingredient to improving university capabilities and expanding intellectual and economic opportunity throughout the region.
- Engage faculty in curriculum reform, the creation of quality learning environments, and the shaping of policy and strategies aimed at creating the educational infrastructure necessary to produce world class talent.
- Create a community of globally-engaged educators throughout the Americas.
- Realize the vision of a '*Global Engineer*' throughout the Americas – graduates who understand social, cultural, and local considerations and are prepared to compete in the global marketplace.
- Build community among students leading to global understanding, experience, and sensitivity. This in turn will enable creativity, stimulate innovation, and result in a more

robust community of future engineers, faculty, and researchers able to compete effectively in the world economy.

Engineering for the Americas Next Steps

As a result of instituting a Provisional Executive Committee, Engineering for the Americas has reaffirmed its partnership and is planning to expand the initiative in several important ways:

- a. strategic activities around institutional consolidation of the initiative such as designing marketing and communications materials, set up an EftA website and sustainability planning
- b. develop stronger relationships with international financial organizations such as the Inter-American Development Bank, and the World Bank to understand alignment of their regional Education and Private Sector Development strategies with EftA, direction with existing country needs and explore opportunities for joint activities and partnerships
- c. cultivate thinking among policy makers, civil society organizations, and governments and the regional private sector regarding engineering as a basis for growth and seek to shape opportunities for alignment and leverage
- d. expand the EftA partnership to focus on including all parties in shaping a hemispheric response to the challenges we share regarding globalization and its implications and how to maximize its opportunities for all, in a more inclusive way

Through inclusive partnerships, *Engineering for the Americas* hopes to build meaningful collaborations resulting in momentum and systemic reform around engineering as basis for long term sustainable growth – in economic, social, and human terms. EftA strategies focus on improving engineering and technical education, applying quality assurance (in the form of internationally recognized accreditation), and fostering an environment of job creation, entrepreneurship, and expanded opportunity for success through engineering and technology.

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