

The Ibero American Summit on Engineering Education, the Engineer of the Americas and its Challenge to the Continent

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Abstract — *The International Conference on Engineering Education (ICEE) series has been a significant forum for discussions on a broad range of topics related to engineering education in the international context. These conferences have fostered considerable participation, particularly by those countries that have hosted the event. Nevertheless, the ICEEs have not engaged several areas of the World, in particular the Latin American countries, which, with the exception of Brazil, have not been represented by a sizeable delegation. It is obvious that the globalization process on its present stage is producing positive economic and social changes through concerted actions of regionally defined groups of countries (e.g., NAFTA or the European Union). It appears that the route to broad globalization will include the establishment of strong Regional networking entities ready to guide broader participation and able to recognize regional issues within their regional contexts. These two perceptions suggest that, in addition to the normal ICEE series, Regional conferences should be held to discuss specific challenges. For the Latin American countries, a collaborative environment between this region and North America and Europe would advance Engineering Education in the region and promote economic development. This was the motivation for the First Regional Conference – the International Summit Conference on Engineering Education – IASEE 2003 – held in the Campus of the University of the Vale do Paraíba, São José dos Campos, State of São Paulo, Brazil in the period of March 24th to 27th, 2003.*

Index Terms — *Engineering Education, Engineer of the Americas, Regionalization and Globalization, Regional Conferences.*

INTRODUCTION

The International Conferences on Engineering Education – ICEEs – has been an important forum to discuss new tendencies on Engineering Education, modern mechanisms to introduce updated technologies, class room strategies and several other didactic mechanisms to improve Engineering Education, but a particular attention has being given to the importance of the internationalization of the Schools of Engineering within their undergraduate programs. Modern Schools of Engineering, particularly those in Ph.D. granting Research Universities, have a broad international connection with other similar institutions in their country and abroad within their research and Graduate Programs, nevertheless, very few connections exist among undergraduate programs, although they are of deep importance to the establishment of a local basis of technological knowledge that proved to be of fundamental importance to help modern industrial activities to thrive.

The NSF funded program of the Coalitions of Schools of Engineering in the US is an important example of an effort to approach several Schools of Engineering around the main question of their Undergraduate courses [1]. This program is, nevertheless, strongly anchored on research universities, and their National and International networks proved to be of fundamental importance to the success of the established coalitions. Moreover, this program has been an important driving mechanism to the presence of a sizeable and active North American delegation in the several ICEEs.

The establishment of networks of partnerships equals in importance to the specific philosophical and technical discussions on Engineering Education. The Schools of Engineering in Brazil, for instance, profited with the American program of the Coalitions by establishing the National REENGE program in the middle 1990's. The Brazilian program was

born, since its conception, within a context of institutional collaboration [2]. The Brazilian delegation to the ICEEs has been very important, both in size and activity, since the 1997 version of ICEE in Chicago (USA).

The main difficulty found by the Brazilian Professors in attending the ICEEs has been the recurrent question on the acceptance by the community on the relevance of conferences devoted to education and not to research. The concept of “academic relevance” is taken in the academic community as related to research and Graduate studies, while it is seen as connected with purely theoretical without practical value by the society. In countries where grants are distributed by peer evaluation processes like Brazil, this acceptance depends on the scientific community of the research universities that has shown a slow but steady growth on its interest on the subject of Engineering Education and the obvious implication of this subject to the National development, since it is associated to the presence of top industries and to their ability to foster innovation on newly born hi-tech small enterprises.

The research universities, in one hand, make feasible and sounding any National program on Engineering Education but, on another hand, are slow in fully accepting its positive aspects.

Brazil has a very specific position among developing countries due to its well established research universities and funding agencies. In Latin America, Mexico, Argentina and Chile have a similar situation. This specific situation and the favorable influence of the US coalition program allowed Brazil to establish a flourishing program on Undergraduate Engineering Education improvement that was well anchored on Ph.D. granting institutions.

The strong globalization of the world economy and of the production processes has steamed the interest for a new professional of Engineering with international background and vision. The ICEEs have been an important forum for these questions and helped to stitch several effective approximations between institutions of Higher Education in the World. The absence of Latin American attendees other than Brazilians in the ICEE series prompted the ICEE Steering Committee and iNEER (the International Network of Engineering Education and Research that helps the ICEE organization) to create mechanisms to foster the presence of attendees from non represented regions. The regional conferences were devised with the comprehension of “Regions” in the supra National meaning, exactly to tackle questions of Regional interest to a Regional public but within the perspective of an international vision.

The example of Europe as a Regions was taken carefully since the very beginning of the conception of the IASEE. The Summit counted, since the first moment, with the very relevant support of Spanish representatives, later followed in Europe by German, Danish and British representatives. The Continent of the Americas was represented by 11 countries and more than 200 attendants.

The key concept of an Engineer, as a professional that would be well prepared to deal with scientific and technological aspects of new markets or of new social needs as well as a professional fully equipped to follow the natural cultural barriers within the Continent helped us to coin the term “Engineer of the Americas”, whose profile was discussed along the IASEE in its general terms.

IASEE FORMAT AND STRATEGY

The IASEE is the first Regional conference on Engineering Education born as a spin off of the ICEEs, though, its format and strategies could not be based on past experiences.

The format of the three day Summit, that offered also an extra day devoted to a workshop, was based on key note speeches, panels, the formation of specific task forces and a workshop. The key note speakers were chosen among well respected presenters that brought to the audience the experience already reached in Europe, as part of the European process of higher education approximation, the experiences of the already existing accreditation bodies in the Continent of the Americas, as well as in Europe, and also the vision of the industry on the importance of defining and implementing the concept of the “Engineer of the Americas”.

The panels put together experts on the areas chosen as focus of the meeting, establishing a moment of discussion among the panelists and the audience. The task forces dealt with the focus of the conference and helped the audience to find the principal difficulties in the defining the concept of the Engineer of the Americas as well as finding the difficulties in the further process of implementing common mechanisms of accreditation and curriculum design.

In this Summit, three basic strategic aspects were taken into consideration:

- The focus of the program on a few specific Regional relevant issues
- The pre-existence of several networking institutions with specific and somewhat overlapping objectives and missions
- The necessity to pave a road ahead that leads to specific goals, based on a program of actions that takes into consideration the realities of the continent.

The conference was focused in four issues:

- University – Industry Interaction
- Curriculum Development

- Accreditation
- Funding Mechanisms

IASEE RESULTS

The IASEE results reflect the conclusions on the four focus of the conference. Most of the results were obtained by the specific groups during the task forces meetings. These results were later summarized in two plenary sessions and involve the four focus of the meeting. The focalization of Regional conferences proved to be an essential ingredient to its success, leaving to the Conferences on Engineering Education the responsibility to carry the complex discussions on more general items.

The first focus was on the University – Industry Interaction. This is an issue that underlines one of the characteristics of the continent: the large asymmetry in the actual stage of industrial development in Latin America and in the US. This asymmetry should be taken into consideration as a real fact and also as a cause and to some extent as a consequence of the asymmetry between the level of the Schools of Engineering in the Continent. The differences in the level presented by research institutions is, nevertheless, much smaller, probably due to the intense interaction already established in the area of research. While education is still a local toil, research is already an international activity and proved how enriching interconnectivity could be.

In a global world, the relevance of local development is crucial to the further development of the top industries [3]. The industry, the main sponsor of this event, is deeply concerned with the asymmetric continental situation and the consequent limitations on the effective market size and on the real ability to foster a widespread surge on innovation. It is a basic assumption of the IASEE that the establishment of important networks of School of Engineering in partnership with professional associations, accreditation institutions, industry and the government has positive economic and social consequences.

The second focus was on the curriculum of Engineering, that represents a synthesis of a vision of a new breed of professional and the mechanisms to forge a technical workforce ready to support advanced industries. This synthetic vision has been seldom tackled along the ICEEs programs but was taken to the heart of IASEE in association to the comprehension of the importance of educating an engineer able to understand the present social realities and the market changes.

The third focus was on accreditation. Discussions on this subject were based in the need for mechanisms of evaluation of the Engineering Education process that is external to its principal stakeholder – the School of Engineering – but is built on a consensus of the several other stakeholders, what includes the industry, the government and the society at large. Several accreditations bodies were present to the Summit, and presented their mission and modes. Although seen as far reaching, the hypothesis of a continental system of accreditation was taken as a necessary future step.

The fourth focus was on funding mechanisms that could foster the conception and implementation of networks along the continent and also that could finance studies on the several specificities of every country in the continent and how to better define the concept of Engineer of the Americas and how to devise mechanisms to implement educational processes to forge this professional and how to market this format to the productive sector.

Besides the focused aspect of the meeting, the IASEE dealt with the existence of several networking associations, like ISTECS (Ibero American Science @ Technology Education Consortium), CoHemis (Center for Hemispherical Cooperation in Research and Education in Engineering and Applied Sciences) and ASIBEI (*Asociación Iberoamericana de los Dirigentes de las Escuelas de Ingeniería*). Those associations connect several countries in Latin America to the US and Spain and deal with several areas of research in Engineering, Engineering Education and even accreditation. During the IASEE all those associations offered their experience, network assets and also tried to devise mechanisms to proceed with the concept of the Engineer of the Americas. They offered their future formal meetings as moments to organize new face to face gatherings that aim to review and to evaluate the stage of advancement of the process of definition and implementation of the concept of the Engineer of the Americas.

THE ROAD AHEAD

The existing institutions and the future meetings of the ICEEs defined milestones in the road ahead of us that still must be paved. The ICEE in Valencia (July 2003) is a moment of reflection on the IASEE results, while the ICEE in Florida (Gainesville 2004) will be a moment when a clear definition of the concept of the Engineer of the Americas should be ready, a clear set of specific stakeholders that will participate in the implementation of the first breed of such professional must be organized and proposals to the implementation of the Engineer of the Americas should be devised.

The next important moment will be the ICEE 2006, to be held in Puerto Rico, when the participating Schools of Engineering in the Continent must be responding to the proposals formulated in Gainesville.

CONCLUSIONS

The concept of the Engineer of the America is a far reaching goal that is still in its preliminary stages. Similar concepts involving professional with University Education within the European continent took years to reach consensus, and were discussed within an environment of political integration. The Bologna Declaration [4] was signed in June 1999 bby Ministers of Education and was the subject of vivid discussions not only in the environment of the University and of civil societies, but also in political forums, like Nationals and European Houses of Representatives.

The IASEE attendees were mostly representatives of Schools of Engineering, professional societies, governmental funding agencies and the industry. The results that were reached lack political value, but the proposed road ahead is a mechanism to foster the improvement of the Engineering Education quality in the Continent of the Americas and to offer a common objective to participating Schools of Engineering, as well as to help to devise common mechanisms of evaluation.

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