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## **AC 2012-4609: STUDY ABROAD PROGRAM IMPACTING ENGINEERING FORMATION: CULTURAL IMMERSION (CIB)**

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# **Study Abroad Program Impacting Engineering Formation: Cultural Immersion (CIB)**

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## **Abstract**

The study abroad experience described in this paper has showed as one of the most effective ways to promote the retention rate in engineering programs. Among the outcomes are the dynamic addition to undergraduate career; the opportunity for long-lasting friendships; the enhancement of technical skills and knowledge; understanding the different cultures and histories and an addition to life enrichment. The main goal of the program is to provide the future engineers with tools and extra experiences to develop a career as engineers in a more adequate to the present challenging and mutant work market.

**Key words:** practical experience; work in teams; prosperity; global opportunity; life experience; prosperity.

## **1. Introduction**

Social groups have ambiguous understanding about science and technology; some understand it as responsible for the environmental deterioration and the voracious capitalism and others as the ones responsible for the better quality of life with the improvement of health systems, agricultural production and other accomplishments. Both perceptions are not far from reality. In any case the impacts can be seen along the history and more recently with the sophistication of so called “information society”.

This particular “information society” shows how strong can be the impact of any technology introduced in society. Real time communication, brutal amount of information available have changed drastically how people relate, make business and study. Engineering occupies an important role in this “brave new world” and it is in fact crucial for the development of science and technology and more important it is responsible for the delivery of such technologies on the service of the betterment of humanity. This aspect may lead to the notion that engineers should be aware of the responsibility to society as they contribute to its development.

The contemporary paradigm of education preaches among other requirements the international experience as one of the most important skills in the formation of the new engineer. The environmental consciousness, the willing to work in teams, and etc, it is a long list but the most

important aspect of engineering formation is the strong knowledge of basic sciences and basic sciences of engineering because these are the tools that will enable the future engineer to perform successfully and more over it will give them the self confidence necessary to win. However this is one aspect in the formation of engineers. Others are being examined and discussed and many actions have been taking place in many institutions in order to form the engineer for the new work environment [1].

Among many projects in education field COPEC develops also what is called CIB – Cultural Immersion in Brazil: It is a project that brings to Brazil students from abroad in a program of 15 days (can be more or less) when they have academic, technical, social and cultural activities. It is very intensive period when the students visit 5 of the 9 cities of Atlantic Forest Region at the sea shore of Sao Paulo state, as well as visit to different industries and universities.

The program is designed in order to provide engineering students the opportunity to reflect about engineering social responsibility and ethical dilemmas when developing projects. This awareness is becoming more and more necessary due to the environmental/ethical/economical crises that humanity is facing and that impacts not only the society but also the education in every level.

## **2. Work Market Today**

Innovations in science and technology are shaping the present work market in such a way that from now on “changing” is the role and not the exception. It is a changing world and a changing work market in every level. Technology has enhanced work place that means less hand work and more mental work. Thanks to information technology the workplace is now team-based. Management styles have changed with horizontal structures where everybody is responsible for the results of the work requiring less supervision. For workers in any level the expected profile comprehend attitudes and behaviors to work in teams. The job environment is different due to the way that companies run the business now; jobs positions are displaced, others take places and shifts are always changing in according to the new necessities[2].

Among the dramatic changes in work market it is noticed that now more jobs are part time; more people are self employed; less staff needed to accomplish works; paid and unpaid overtime work are increasing; global competitiveness; flatter organizational structures; companies downsizing, less job security. Advanced communications technologies continue to alter the way businesses and societies conduct themselves and interact with each other.

Today's engineers are expected to work globally-collaborating with team members located in various countries with diverse languages and business cultures to engineer products and services that insure the company's competitiveness in the global economy.

Men are living now in a changing work environment full of surprises and unpredictable events in a daily basis. The best way to overcome and to survive is to be prepared achieving knowledge and be willing to develop new skills. May be the main skill is the development of the capacity to see the opportunity of a new work, a niche that can be explored and generate good results no matter where it is. The learning of languages and the sensitiveness to behave properly are some of the skills necessary for the new work market [3].

### **3. The Concept of Prosperity**

Prosperity is defined as the state of being successful and it is not economically, it evolves the health, the family, the job, self-esteem and social relations. It is not social assistance that deepens ignorance and poverty. A community can achieve this status and it is just a matter of willing to. In fact there are places in the world that the society is organized and prosperous at least economically speaking, which leads to healthier environment and higher self-esteem [4].

The new demands and the engineering minds came up with new kinds of sustainable energy generation, new renewable fuels and materials, recycling machines and many others innovations that are changing the way people live [5].

It may sound some kind of dream however many dreams become true and as engineering is the art of possible it is not craziness to speak and think about this, engineering promoting prosperity.

### **4. Prosperity and New Technologies**

The transformations that happen when a new technology is delivered are not perceived by society however some times the effects are devastating. Unemployment is one effect of some technologies that were introduced in producing systems. The pollution is another one and many others of a vast list. By the other hand the positive results are very strong once technologies keep coming and being spread. In many fields the impact is such that people expect more and more new and better technologies such as in medical field; new sophisticated equipment that make quick diagnosis, last generations of medicines, high technology for surgical interventions and etc [6].

Still engineers will always have to have a strong analytical skill in order to perform in any field and they will use it to solve problems. That is what makes them problem solvers [7].

### **5. Engineering Education**

Engineering is a social unit, with significant decision-making power in the process of development of society. The engineer is, above all, an opinion leader who builds his/her ideas from the benchmark set by their professional community.

The academic knowledge must provide the basic foundation to get, keep, and progress on a job to achieve the best results.

Sustainability is another aspect when it is about the impact of engineering projects; so new and more complex demands are arising due to the economic and social needs for the present business world. The perception and the capability to deal and work under this paradigm of work is something that must be fostered during the formation of an engineer [8].

In search of a social development compatible with future necessities and expectations of humanity it is necessary a broader approach to practice professional engineering in order to

promote the capabilities of current generations to build the basis of material, environmental and cognitive that will be necessary to preserve and expand human freedoms in the future.

It is also important to emphasize the relevance of engineering - without ignoring the contributions of other fields of knowledge - in the process of social development, the multiplicity of engineering professional roles and the broad involvement of staff in their activities.

## **6. Engineering Promoting Prosperity**

Engineers should promote the progress starting combating poverty no matter where it is. Although it is not an easy task for sure if engineers invest in thinking about these problems and search to find the ways to defeat them certainly it could be solved as many problems in big constructions for example, are solved [9].

The awareness of social and environmental impact of engineering projects is one step forward in this direction. The simple fact that many social and environmental problems can be avoided is advancement. Even when economical aspects are stronger the awareness of these variables (social/environmental aspects) in project can make a difference.

## **7. COPEC's Programs Fostering Engineering Career**

With the goal to enhance the formation of engineers COPEC as a scientific organization has started its study abroad program that has developed and is now in a new stage.

The experience leaded to the present offer of a program focusing the social aspects of engineering; its impact on society and the implications of development of projects taking into account the human being as an organized social group.

The idea is to have a critical mass of young engineers motivated to act in order to solve social problems. It is a work of seeding the idea for future engineers.

## **8. Aspects of the Study Abroad Program**

- All the activities are accomplished in 10 or 15 days of intensive work ;
- Academic Activities - classes, in English, about "Anthropology of Economics in Brazil" , in Engineering School of a University;
- Technical Activities - visits to sites of interest and visits to enterprises;
- Social Activities – the students have the opportunity to visit some very interesting places meeting with natives in a friendly environment;
- Cultural Activities – Among others visits to Museums , Art Galleries Zoos, Sea Aquarium, providing the students the notions of Brazil's history and art as well as the way of life;
- The schedule is formatted in a way to provide them also some free time to rest and enjoy the city and all that it can offer.
- The students are challenged to develop a project to solve a social problem of a community;
- The activities can be changed in order to fit the purpose of the group;
- The program can be done in more or less days in according to the necessities of the group;

- The minimum number of students is 15;
- At the end of the program the students receive a certificate. It is an intense, demanding and rewarding, and of providing a challenging educational environment in a full-service framework.

### **9. Objectives of the Program**

- Enhance Academic and Leadership Abilities
- To foster the interest in solving social problems
- Live in Different Culture
- Enhance Career Goals
- Research
- Travel
- Global Experience
- New Opportunities
- Life Enrichment

### **10. Outcomes from the Study Abroad Program**

#### **For Students:**

- Dynamic addition to undergraduate career
- Long-lasting friendships
- Enhancement of Technical skills and knowledge
- Knowledge about Different cultures and histories
- Life enrichment
- Management of Stress
- Work in Teams
- Development of Feeling about Opportunities

#### **For School:**

- Rising of Retention Rate

### **11. Final Remarks**

There is a remarkable gap between independence and the neglecting scientific-technological and social development. It is currently witnessing an unrestrained race in the pursuit of development and application of technology, without worrying to undertake the necessary efforts to structure society to understand, administer and implement this technology to their advantage.

In the new social context individuals are faced with a situation in which they must adapt or rebuild their references from a model that is constantly changing and presents them not ensures continuity in social interactions.

Anyway, this new model of society put change as fetish, rather than the necessary stability maintaining an appropriate model of social development.

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