

## What's in it for me? The whys and wherefores of international exchange programs

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***Abstract** — The globalization of National Economies and the globalization of Engineering Education are concurrent processes that feed back upon each other. This paper discusses the most significant benefits to be derived from a program of international exchange in Engineering Education, from the distinct perspectives of institutions in Industrialized and Developing countries. Careful matching of institutional expectations and outcomes appears to be a critical factor in the success of such ventures.*

*Index Terms* — International Education, Exchange Programs.

### **Introduction**

One of the historic trademarks of the Engineering profession has been its devotion to the never-ending process of personal and institutional self-actualization. The ever-accelerating pace of technological development has declared technological obsolescence to be the Capital Sin of the engineer. But technological advances have also changed the socio-economic context of societies and institutions. Whether we like it or not, at the dawn of the twenty-first century truly the World is at our collective doorsteps.

In this new open environment, engineers have to learn to think globally from the start. The industrial product of today was probably conceived by a Central Office in Vienna, New York or Tokyo, designed by the Engineering Center in Hamburg or Delhi, and built at several plants scattered all over the planet. Most likely using parts design and built half a world away. The true situation in the world has been summarized by the chief executive officer of the General Electric Company as "If you can't meet a world standard, you're not even in the game." [1]

These globalization processes are happening at every field of human endeavor in a parallel fashion. Economic barriers are being torn down, but they were preceded by social segmentation and closely followed by political boundaries. And the Future holds more of the same.

Clearly a 'global outlook' is about become one of the essential tools that engineers need to succeed in their profession, in addition to solid technical skills. What I have called a 'global outlook' is in reality, a combination of skills, including:

- Ability to understand and interact with another culture
- Awareness of Global issues
- Contextual background knowledge about the World we live in
- Command of at least two of the languages in common use in the World: English, French, Spanish, Portuguese, German (with perhaps Mandarin and Russian to be added to the list.)

To make matters more interesting, several globalizing efforts have been initiated by national and regional economic entities, as well as professional societies and political groups. In the Americas, the impetus of Free Trade agreements is creating many opportunities for the nations of the hemisphere to build bridges to each other. These efforts are overshadowed by the more significant steps taken by the Western European nations in recent years. The World appears to be coalescing into well-defined trade blocs.

In the field of Engineering Education, a number of parallel processes have, again, followed the political and economic trends. The *Erasmus* project in Europe is a good example. More modest efforts also coexist in the American Continent (*UPADI, Intertech*), hampered by the strong undercurrent of institutional autonomy in the region.

In a recent meeting of the American Council on Education [2], the need to intensify institutional programs promoting a global outlook was discussed. Donald Gerth, President of CalState Sacramento and the International Association of University Presidents, said that American Colleges and Universities "need to be players in International Higher Education."

### **International Exchange Programs and Engineering Education**

The implementation of a solid institutional program of Engineering Education with a significant International Exchange component is not a simple task. It requires a realignment of institutional resources, a conscientious effort to streamline the curricula and, most importantly, **the institutional will to do it**. An institution of higher education will shift its priorities to support a project when a clear case can be made about the benefits that the same institution will derive from a successful completion of that project. In other words, the institution demands an answer to the question "What's in it for me?".

### **Potential Benefits**

The following is a partial list of potential institutional benefits of an International Exchange Program of Engineering Education:

1. Globalization Awareness. Students in the program would enter the employment market after graduation with an added value. An engineer with a truly international outlook is not only more competitive in terms of entry-level salary, but also inherently more flexible, able to follow the employment sources wherever they may be. In this sense, globalization awareness augments the benefits of the education provided by the institution.
2. Recruitment of International Students. Engineering Education is an expensive endeavor in the best of circumstances. The financial stability of an Institution is many times affected by

the vagaries of student enrollment, which seems to follow unpredictable cyclical patterns. International students are known to extend the reach of the office of admissions, providing a welcome buffer to these patterns. It must be noted that international students already make up a significant portion of engineering and science students in many institutions in the United States and Western Europe.

3. Enhancement of the Institutional Image. Institutional prestige is a complex phenomenon, but a modicum of international reputation can certainly help. Try this experiment: ask a friend who is not connected to higher education, to name the top ten Universities outside your own Country. The list that is likely to be produced rarely reflects accurate standards of academic quality (as defined within academia!.)
4. Outreach opportunities for its Faculty. Building an academic reputation at the personal level is a process that mirrors the institution-level process discussed in the previous point. An international component is always a positive addition to a curriculum vitae. Opportunities for international travel would be the icing on the cake.

All the benefits mentioned previously can be attractive to an Institution of Higher Education operating anywhere in the World. However, particular national circumstances also provide for a different set of benefits. Using the United States as a particular example, the following added benefits should also be considered:

5. Diversity. According to the most recent National Census figures, the population of the United States is more diverse than ever, and the trend is likely to continue. In response to this phenomenon, many Universities now strive for increased diversity in its student body and its Faculty and Staff. International recruitment can help provide this diversity.
6. Recruitment of Faculty in fields of high demand. In recent years, the explosion of e-commerce has generated a demand for computer professionals far in excess of the ability of the internal market to provide graduates in these disciplines. And when a young graduate, fresh out of a 4-year program can command a higher salary than most of his professors, finding and keeping Faculty can be problematic. An International Exchange Program can help alleviate this problem; many Computer Science Faculty members in developing countries probably received their graduate education in an Industrialized Country. A properly designed exchange program can bring these professors to those institutions who need their services, for a limited period of time.

Conversely, many institutions of Higher Education in the developing World have particular needs and would respond to particular benefits. Among those:

- 1 The possibility of assisting their Faculty in acquiring a graduate (terminal) degree. Most developing nations have implemented national doctoral programs in Engineering. And yet, most doctoral students would greatly prefer to receive their education outside their own country. This happens for many reasons. Some can be personal (a desire to "see the world"), but others relate to the great disparity in academic resources available within industrialized nations.

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- 2 The possibility of providing scientific research opportunities for its doctoral Faculty. This benefit stems from the same disparity mentioned in the previous point. Scientific research in the engineering disciplines is extremely expensive, and most developing countries cannot provide adequate resources required by their scientists. A limited visit to a foreign institution can re-energize a faculty member, and provide the means to maintain a reasonable academic career.

In the recent International Education Week 2000, organized by the Coalition for International Education [3], a comprehensive list of *Indicators of Need for More Emphasis in International Education* was presented. The list summarizes all the important reasons why the United States needs to be actively engaged in international education.

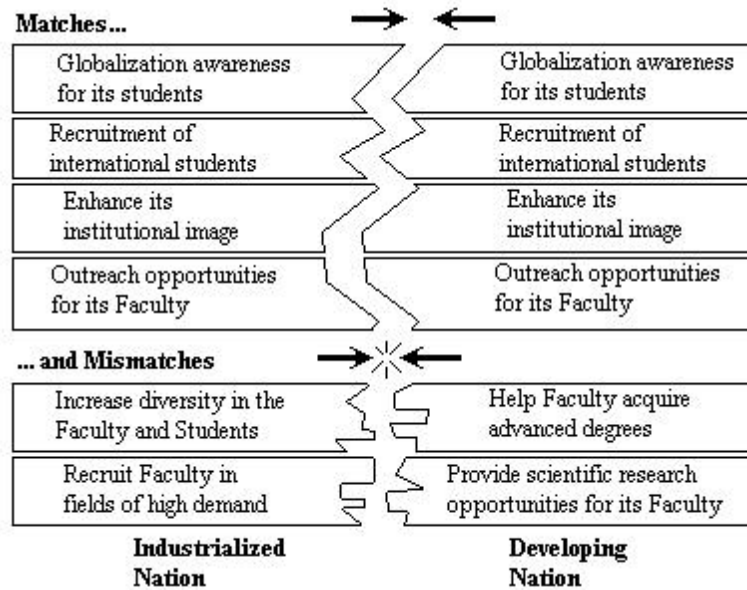
### **Potential Difficulties**

All of the benefits described above come into play in a program of international exchange, because no two countries can match each other's academic resources perfectly. At the same time, one should recognize that an international exchange program can only succeed if all the participants derive some benefit from the program. (When this is not the case, such programs should be labelled "International Aid", and would be the subjects of a very different paper!)

In ideal circumstances, a perfect match would exist between the needs of each of the participants and the benefits to be obtained by the same participants. Such a program would probably be guaranteed long-term success. But ideal programs, like the *ideal gas*, are a useful visualization but unfortunately do not exist.

To simplify the discussion, let us consider the case of a 2-member exchange program, implemented between an industrialized nation and a developing nation. Let us also limit the discussion to the list of benefits presented above, a list which is, by no means, comprehensive. Figure 1 shows the areas in which the benefits "match" and the areas in which they do not. If all eight individual benefit areas come into play, one could almost predict a reasonable chance of success for this particular example. Particular attention should be paid to the concept of Mismatches, when there is a risk that they will introduce an element of contention.

For example, assume that Institution A (in the industrialized nation) wishes to recruit Faculty in fields of high demand, while Institution B (in the developing country) is interested in helping its Faculty acquire a doctoral degree. A few years into the program, Institution A will start to harvest Faculty from Institution B, perhaps on a permanent basis. This is clearly an unstable situation. But careful analysis of the predicted behavior of the participants could perhaps be used to devise some rules of engagement. For instance, Institution B could insist on guarantees that its Faculty will eventually return - with a commitment to spend one of every six semesters teaching, back at Institution A.



**Figure 1. Matches and Mismatches in International Exchange Programs**

### Some Examples

A couple of examples should illustrate some of the concepts advanced in this paper:

1. Faculty Exchange: the University of Cincinnati (U.S.A.) with the University of the Americas (Mexico).

The original impetus of this program [4] combined the following expected benefits:

For the University of Cincinnati: Globalization awareness, Enhancement of Institutional Image, Outreach Opportunities for its Faculty.

For the University of the Americas: Outreach Opportunities for its Faculty, Recruitment of Faculty in Fields of High Demand, Scientific Research Opportunities for its Faculty.

The Program implementation required that at least one member of the Faculty in both Institutions taught a semester in the other institution. The Institutions provided funds for housing and meals, and some travel money, in exchange for the course.

Particular requirements: this program was possible because the students in one institution (UDLA) were used to courses taught in English, while the visiting Faculty of UDLA to UC were fluent in English. Thus, a language barrier did not exist in this case.

Prognosis: the Program ran fairly successfully for six years. It was discontinued in the end, mostly due to changes in the academic administration at both schools.

2. Comprehensive Exchange between the College of Staten Island, City University of New York (U.S.A.) and several Chinese universities.

The CUNY China Study Abroad program, initially developed in the mid-80's to provide american students with a cultural exchange program with the people's Republic of China, has become a springboard for a number of initiatives. Through this umbrella agreement, many american academics have arranged for short-to-medium term visits to chinese universities, and many chinese scholars have travelled to the U.S.

This is a classical example of matching benefits. During the initial phase of the program, the focus was on undergraduate opportunities for american students inChina, and visiting professorships for Chinese academics in the U.S. Over the years, the program has evolved into a considerably more complex exchange.

Prognosis: the program has been successful and continues to operate. It must be recognized that the program became possible only because both parties recognized the potential benefits and excercised considerable academic leadership in its implementation.

### **Conclusions and Recommendations**

- a. *A Program of International Exchanges* within engineering education can be successful, if sufficient attention is paid to the evaluation of institutional motives and the analysis of operational interactions and outcomes.
- b. Such a program can **only** be successful if all participating institutions derive clear benefits from its success.
- c. The Engineering Education Community must do its part to foster greater international communications and global awareness.

### **Bibliographic Information**

- [1] Sherman, S., "Are You as Good as the Best in the World?"; *Fortune*; Vol 128, # 15; December 13, 1993
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### **Biographical Information**

A native of Mexico, Dr. Jose L. Torres graduated from the Thayer School of Engineering, Dartmouth College. He has served as Professor of Engineering and Dean of the Division of Science and Technology for the College of Staten Island, of the City University of New York, since 2000. He lives in New York City.