

## INTERNATIONAL ASPECTS OF ENGINEERING EDUCATION IN EUROPE

Ian R. SIMPSON  
ENST de Bretagne/France

### 1. INTRODUCTION.

In the November 1996 edition of ASEE's excellent Journal, "*Prism*," Russel C. JONES, Executive Director of the National Society of Professional Engineers in the USA, published an article entitled : "*The World as Workplace*." He concluded this article with the following paragraph :

*" The era of international practice for engineers has clearly arrived, and each engineering education system must revise its programs to adequately prepare its graduates for work in the global marketplace. To do less would be to relegate the technical productivity of a country to less than competitive status in the international arena."*

I wholeheartedly endorse the author's sentiments, for they represent a policy which, in Europe, we have been trying to implement for the past ten years, not without a good deal of pain and suffering. Maintaining a parochial attitude is the easy option : "*We've done it like this for the past two hundred years, so why change?*" If we don't change, then other people will rapidly overtake us and conquer markets in which we used to reign supreme. The innovations foreseen by Russel C. Jones include :

- \* *Proficiency in Foreign Languages.*
- \* *Cultural and Historical Awareness.*
- \* *Sensitizing all members of Faculty to international aspects of an engineering education.*

In a European context, the current fifteen Member States of the European Union (EU) are grappling with such problems as *Economic and Monetary Union* and a possible *integrated political convergence*. The former will mean a common currency. The days when you had to change your money when you traveled over a European border are drawing to a close. "*Thank Goodness for that,*" shout the seasoned travelers. In 1999, the German Deutschmark, the French Franc and the British Pound could be replaced by the "*Euro,*" whose value at the moment of writing is around 1.20 dollars. Political

convergence could lead to a *United States of Europe* (USE) with a common Parliament and broadly similar objectives in terms of foreign policy. This idea is not a popular one at the moment but it does have its supporters, provided that the Brussels bureaucrats do not intervene excessively in determining the shape of European cucumbers! Diversity must continue, given the history of the Old Continent, but convergence must also be at the forefront of our efforts. Old enmities must be wiped out and, as educators, our role is even more important than that of the politician's since we can provide rapid proof that it is possible to cooperate and that diversity can lead to the common good.

(Common/wealth?) Ireland and the ex-Yugoslavia show that cultural and religious problems still rear their ugly heads, but we must endeavor to instil in our students a mentality of collaboration rather than one of hostility, division and difference.

More and more European students are spending part of their academic curriculum in a university outside their home country, even in subjects such as engineering which, until very recently, were not renowned for their international content.

## **2. INTERNATIONAL ASPECTS**

### **i. Modern Languages**

Since its foundation in 1977, the Ecole Nationale Supérieure des Télécommunications de Bretagne, one of France's foremost colleges in telecommunications training, took the then unusual decision of putting the emphasis on international activities. Twenty years later, this decision has proved to be a wise one, for the field of telecommunications provides its graduates with enormous opportunities at home and abroad. One only has to think of the mergers, joint ventures and other collaborative schemes which have appeared over the past few years as deregulation has begun to break down national barriers and literally to "open up the world." An engineer in telecommunications must be familiar with foreign languages, foreign markets, the Economics of telecommunications and certain legal and contractual aspects of the profession.

In 1977, we introduced the study of two compulsory foreign languages and every student spent 8 hours per week studying them. We now teach ten modern languages. (Arabic, Chinese, English, French, German, Japanese, Polish, Portuguese, Russian and Spanish.) Teaching French in France may seem rather strange, but we now have 35 different nationalities present on our three campuses and 16% of our student population is non-French.

All of our students have to reach Level 4 in two foreign languages on a scale in which level 1 represents "Beginner's" and level 5 "Bilingualism." If they don't reach the required level, they don't graduate, no matter how brilliant they may be in Computer Science, Signal-Processing or Multimedia Networks. The students' level in modern languages is tested in our own in-house examinations as well as in totally independent external tests such as *TOEFL* and *Cambridge Proficiency* for English, the *Goethe Institute* for German, the *European Chamber of Commerce Examinations* in Spanish. Obtaining a Language Proficiency Diploma from an internationally-recognised body is further proof to any potential employer that the linguistic competence of the engineering graduate student is no bluff.

We are not trying to train world experts in Shakespeare's literary works, but we do aim to produce graduate engineering students who can make a coherent contribution to any conversation at normal speed, without making any terrible grammatical or cultural mistakes. Learning Arabic, for example, will necessarily entail the study of the main precepts of Islam. This is useful, indeed almost vital, if you are trying to sell telecommunications switching equipment to potential Saudi Arabian clients. I personally know of a large contract being lost for the simple reason that the French engineer involved (with a product far superior to that of his German competitor) did not speak Portuguese when dealing with Brazilian customers. Russel C. Jones's reference to the "*Global Marketplace*" and to "*Competitive Status in the international arena*" becomes particularly relevant. During the Iran-Iraq War, another of my graduate students found himself in an extremely hostile situation. In an air-raid shelter near to a sensitive location being heavily bombed, his knowledge of Arabic and of Islam certainly helped to save his life. He didn't tell me whether his attempts to sell telecoms equipment had been successful!

Teaching foreign languages is not cheap. The Modern Language Department in my college is made up of 13 full-time faculty as well as 42 part-time members of staff. For a total population of some 800 students, the annual expenditure is not far from half a million dollars. The Brazilian contract mentioned earlier was 20 times that figure. If a college decides to invest in international activities, the members of the Department of Modern Languages should be encouraged to become involved in all of the aspects of their profession : teaching the foreign language and organising contacts, exchanges, internships and all kinds of other relationships between the home institution and its foreign partners. In the case of my own college, most of the language faculty are native speakers of all the languages we teach, which is reassuring for our foreign partners when we first try to establish contact. Having spent eleven years as Head of the Modern Language Department at ENST Br, my own attempts at organising international contacts were not, initially, entirely successful. Some full-time and part-time faculty have thrown themselves into the international side, while others have put forward the point of view that : "*I am here to teach English from 9am to 1.30pm every Monday. I'm not paid to organise international activities. It's not my job.*" In the end, we agreed to compensate language teachers who joined in international activities in the form of "Coordination Units." In crude terms, this means that they earn an extra 50 dollars per month.

## **ii. The Role of Science Faculty**

Members of the scientific Departments have also been encouraged to play an active role in international activities by becoming tutors to our students who spend time abroad. This has led to collaboration at research level between our own professors and their colleagues in other European countries. Visiting foreign students are also supervised by our own faculty who have come to realise that some foreign students are pretty intelligent and can have original ideas, even if they don't speak the same language as their supervisors! Career prospects/tenure could be enhanced by agreeing to supervise the final-year project of a foreign student even if this does mean problems in communication, extra hours of tutoring and a lot of hassle. Last year, a colleague of mine supervised the project of a

Texas A and M student. My colleague's knowledge of English was limited, the American student's knowledge of French was non-existent! But, they went hunting together, got to know each other and a good project was finally produced. On top of that, the American student told me that he had never seen such a feast after the hunt. He went back to the USA at least 20 pounds heavier than when he arrived and latest reports indicate that my French colleague will soon be accepting an invitation to go and shoot anything that moves in the Houston area of Texas.

### iii. Student Placements Abroad

As part of our international program, all of my students have to validate a period of at least two months spent working abroad in order to qualify for graduation. This can be achieved in one of the following ways :

- \* *A summer placement in industry or at one of our partner universities*(Duration : 2 months)
- \* *A final-year internship in industry or a research laboratory* (Duration : 4-6 months)
- \* *A complete final year* (Duration : 9-13 months)

Each year is made up of 210 students and it is no easy task finding so many placements. The final-year internships often lead to publications in international reviews and enable further contacts to be developed at research level between our European partners and home faculty.

The final-year abroad has led to the development of "*Dual Degree Programs*" between several of our European partners and ourselves. In the UK, for example, my French students register for the whole of a "*Master of Science*" course in subjects such as Computer Science, Signal-Processing, Microwaves and Optoelectronics. On obtaining the M.Sc, my students also qualify for our own "*Diplôme d'Ingénieur.*" Over the past ten years, whole networks of European partners have come into existence enabling the exchange of students throughout all 15 member nations of the European Union. 1996 saw the most remarkable example yet of academic collaboration. A Spanish student from a prestigious Telecoms Training College in Barcelona decided to spend his final 2 years with us in France. He was top student in Spain after three years, a feat which he repeated with us in France, during his fourth year spent on our 2nd year program. As part of the same network, he then decided to spend his final year (his 5th year of the Spanish program and our 3rd year) at Aston University in the UK, where he also obtained a "*Distinction*" on a "*Master of Science*" course in telecommunications. I believe that this is the first example of a student using the European programs to obtain a triple degree : the French and Spanish Engineering Diplomas in Telecommunications and the British M.Sc. At the end of his course, he also spoke Spanish, French and English with great fluency. (Catalan is his mother tongue.) His final-year 6-month project was performed with NORTEL in London who made him an excellent job offer.

At my college, such schemes exist with partner universities in Spain, Germany, the UK, Finland and Sweden. It is not easy for the students who make the difficult decision to go abroad for a year, to speak a foreign language, to eat strange food, to integrate a totally different system. I think that we are on the right road since my 6th European wedding will be celebrated in September 1997, a sure sign that French students are able to "come to an understanding" with their fellow Europeans! Their whole outlook is broadened by such an experience, they return to France as mature adults and are very quickly snapped up by international companies who appreciate that such students are a rare commodity and worthy of a good salary.

### **3. European Projects**

The European Commission has fostered many projects throughout the fifteen Member States of the Union. These projects range from activities in Infant schools ( *COMENIUS* ) right up to Ph.D level. Some of them provide funding for students to spend part of their curriculum as a full-time student at an Institution in another Member State (*ERASMUS = European Action Scheme for the Mobility of University Students*), while others enable students to perform industrial projects in companies outside their home country. (*LEONARDO*) The Commission also provides a certain amount of funding to encourage such ventures. My students who participate in the *ERASMUS* program receive an extra 100 dollars per month to help them with travel expenses. Those who perform an industrial project in a company abroad currently receive about 350 dollars per month from the Commission, while the host company is supposed to provide a similar sum. Living in London, for example, on 700 dollars per month is not easy for those students concerned but the experience is often very worthwhile, for the students learn about industrial practices in another Member State while speaking another language. Several of my students have been offered full-time employment by the foreign company at the end of their internships. In the field of telecommunications, companies with global objectives have realised that it is in their own interest to employ "native" staff. It is no secret that a company such as British Telecom (BT) hopes to push its non-British staff up to around 30% of its total workforce worldwide. As international educators, we should applaud such an enlightened view.

The European Commission has also encouraged links between the fifteen Members of the Union and the ex-communist countries in Central and Eastern Europe. A program such as *TEMPUS (Trans European Mobility Program for University Students)* enables the exchange of students between East and West Europe. It also provides considerable amounts of funding for upgrading the equipment in the universities of the ex-Eastern Block nations. Thanks to this program, my own college now runs a joint Ph.D program with the Technical University of Budapest-Hungary. The students involved spend two years in France and two years in Hungary. The supervising faculty visit each other's institutions regularly, give short lecture courses and have common research programs. Many European universities are now joining in a program called *ECTS (European Credit Transfer System)* which enables the official validation in the home institution of courses undertaken and passed by students in the host institution. A full academic year is worth 60 credits, which must be allocated in the official syllabus to the various modules,

practicals and projects involved. At the end of the term/semester/year, an official transcript of the grade-sheet for each student must be provided for validation in the home institution. This system will mean having to try to harmonize grading systems across Europe, a difficult task. For example, 13 out of 20 is considered an excellent grade in some countries and a mediocre one in others.

#### 4. CONCLUSIONS

Bringing together 15 nations is no easy task. It requires huge political will and leaders of vision to bring such a venture to a successful conclusion. In my opinion, Europe does not possess such leaders at the moment. It is inevitable that Europe must come together to form a Federal State with a common currency and common political objectives. Those who think otherwise are, obviously, entitled to their opinion (we do live in a democracy!), but they are deluding themselves if they think that any one individual European State can, on its own, wield sufficient political and economic clout to influence world events and to provide a prosperous, peaceful environment for its own citizens. Together, as a United Europe, we have a reasonable chance of improving our own living conditions, of creating a vibrant economy and of banishing conflicts within our own zone of the planet. Where are the European leaders capable of explaining such a vision to their own citizens? As educators, we must begin this task and persuade our students by setting an example, by encouraging them to study abroad, to learn other languages. We must instil in them the fact that we do now live in a Global Village and that we can no longer sit in our own little corner of the village shop lamenting that Europe has no vision, that it must remain divided by language, culture and tradition. As educators, we can help to provide a new vision for the young people in our countries.

In practical terms, this means :

- \* *Creating an "International Office" in every Institution.*
- \* *Hiring a full-time person to coordinate international activities.*
- \* *Developing a true European/International Strategy made up of obligatory periods abroad for every one of our students.*
- \* *Developing international programs/exchanges for students and faculty.*
- \* *Making time and money available for teaching foreign languages in Engineering Colleges.*
- \* *Involving all members of faculty in international affairs, as supervisors of visiting foreign students, as coordinators of specific countries or zones, as remote tutors to home students studying abroad.*
- \* *Introducing courses in Economics, Management and the Humanities.*
- \* *Developing partnerships and internships with foreign industries.*

Once we've done all this, we might just be about to produce students with an international perspective.

**Ian R. SIMPSON** was educated at Durham University/UK. He worked at Paris IV University-Sorbonne before joining ENST de Bretagne as Head of the Modern Language Department in 1978. In 1989, he became Head of International Relations at the same college and has initiated several international programs. He is the author of "English for the Telecommunications Industry" (Oxford University Press/1986) and "English for Telecoms" (York Associates/1995.) Email : Ian.Simpson@enst-bretagne.fr