

Foreword: COMETT and TEMPUS

A. RUBERTI

Former European Commissioner for Research, Development, Education and Training

THIS SPECIAL issue of the *International Journal of Engineering Education* contains contributions from projects supported by the European Community COMETT and TEMPUS programmes.

As European Commissioner responsible for Research, Development, Education and Training, I welcome an issue devoted to programmes that focus on the synergy between R&D and education and training.

Operational since 1987, COMETT (COMmunity programme for Education and Training in Technology) is a programme that aims to improve the application of modern technology by supporting high-quality education and training initiatives.

While technology developments in Europe depend on the supply of qualified people—among them qualified engineers—European competitiveness depends largely on the application of new and advanced technologies. It is therefore essential to promote the education and training of engineers, preferably in a European context. Now, more than ever, engineers employed in industry and academic institutions must keep up with developments in their area of specialization. This is where Community initiatives such as COMETT come in.

It is well known that basic research conducted in Europe is of the highest standard. However, the ability to translate new ideas into new products is frequently less efficient. Education and training are two essential components which help improve technology transfer and, hence, industrial competitiveness.

With this in mind, the COMETT programme has been helping Europe to make optimal use of its highly skilled technical and scientific manpower. The programme has already supported thousands of projects related to engineering education and training, and the results are impressive.

- About 7,000 short courses on advanced technology have been organized in Europe with COMETT support.
- More than 20,000 engineering students have received a grant to work between 3 and 12 months in an enterprise in another country.
- More than 800 exchanges of engineers from university to industry and vice versa have been supported.

- About 3,000 specialized training materials on various technological subjects have been or are currently being developed
- Some 205 University Enterprise Training Partnerships (UETPs) have been set up. UETPs act as an *interface* between university and industry, their main role being to set up and coordinate training activities in Europe in response to actual demand.

Some 22,000 European organizations have already participated in the programme.

This figure includes 13,000 companies, 75% of which are small and medium-sized enterprises. COMETT supports advanced training in more than 60 subject areas, ranging from manufacturing to chemical engineering, biotechnology, software engineering, applied mathematics and environmental engineering, etc.

All COMETT activities are based on higher education-industry co-operation and each project must involve at least one enterprise *and* one higher education institution. As far as engineering disciplines are concerned, such co-operation has many advantages:

- It provides for the mutual exchange of know-how, benefiting everyone.
- It speeds up the practical application of R&D findings.
- It favours the development and implementation of training programmes that correspond to the real needs of industry.
- It pools the expertise of R&D teams with those who actually apply R&D findings in the marketplace
- It allows students to apply their knowledge and skills in a real work environment.

The dramatic events of 1989 and 1990 in Central and Eastern Europe confronted the European Community with unprecedented political and economic challenges. The TEMPUS scheme was one of the rapidly and effectively developed measures designed, within the PHARE Programme, to provide practical assistance and expertise to help the countries concerned to restructure their higher education systems to support the overall economic, political and social reform process.

It was clear from the beginning that TEMPUS would need to be a flexible instrument, able to cover additional Central and Eastern European countries as soon as their inclusion in the PHARE Programme was decided. Between May 1990 and July 1993, the number of countries that had become eligible for TEMPUS increased from two to eleven: Albania, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia. By their participation in TEMPUS these countries have fully acknowledged that universities have a vital part to play in the process of economic and social reform.

From the inception of TEMPUS in 1990, the largest and most dominant subject areas have remained applied sciences, technologies and engineering. This reflected the fact that these areas had until then been more favoured in the eligible countries than other areas, and that it had also been relatively easier for the academics involved there to be in touch with the work of their counterparts in the member states of the European Community. It was thus natural for them to be among the leaders in forming networks, or building on existing scientific contacts. In addition, many of the national authorities concerned initially took the view that these areas should have a particularly high priority in the programme as far as their own countries were concerned.

Since 1990/91, with the development of TEMPUS in other areas and the evolution of a changed perception of the various national priorities, engineering studies have tended to diminish in relative importance, although they still remain the single most salient area of study overall.

In the academic year 1992/93 there were 170 Joint European Projects running in this subject area, 166 of which are focused on restructuring, while the remaining four are vehicles for staff and student mobility. The eligible countries involved most in engineering projects are Poland and Romania, with 57 and 38 projects respectively, followed by Hungary and Bulgaria.

Joint European Projects in engineering studies in the first phase involved 717 participating institutions, 426 of which are universities, 111 are non-university organizations active in the higher educational field, and 180 are enterprises. The beneficiary eligible countries are represented by 92 universities, 37 organizations and 75 enterprises. It is particularly noteworthy that the last of these constitute almost half the total involvement of enterprises participating in TEMPUS, even if the degree of involvement varies considerably between projects.

Within the wide range of subjects comprising engineering studies there is a clear domination, in the TEMPUS perspective, of two principal fields: production and manufacturing, and information technology. In the academic year 1992/93 production and manufacturing accounted for almost half of the total number of accepted projects in the subject area, and information technology accounted for around one-fifth; the remaining projects included civil engineering, applications of biology and chemistry, technological aspects of social and human sciences and basic resources.

The contribution of engineering studies to the overall success of TEMPUS has been, as these figures clearly show, of high importance. Although, in conformity with their analysis of their own needs in the changing economic situation, the eligible countries are now developing a more evenly balanced spread of subject participation, there is no doubt that engineering will continue to be one of the leaders in facilitating the structural reform of the higher education systems in the eligible countries.

While TEMPUS is not designed to be a permanent feature of the reconstruction of Europe, and at a certain point in the future its work will be complete, in the medium- and long-term perspective the programme is intended to allow all the higher education systems in Central and Eastern Europe to reach the level of resources needed to underpin progress towards preparing new generations of well-trained and qualified young people. Within this context, it is evident that for the coming years the concept of the TEMPUS scheme will continue (1994-8), so as to comprise an ongoing large net transfer to the countries of Central and Eastern Europe of the strategic resources, knowledge and expertise that are essential to the development of their higher education systems, and which will act as a catalyst for wider and deeper societal change. The work of TEMPUS during the first phase of the programme's implementation will, in the second phase, not only be consolidated with regard to the countries eligible for support hitherto, but also be extended to enable the republics of the former Soviet Union to benefit from the experience and knowledge acquired so far.

This issue will give readers of *International Journal of Engineering Education* a flavour of the considerable work which has been done and is currently being done by the COMETT and TEMPUS projects to ensure that Europe's engineers rise to the challenges of the 21st century.