

Atlanta EU/US Research and Education Workshop

Key messages

Session I

Transatlantic Science and Engineering Graduate Curricula

Topic A: Strategies to create transatlantic synergies

US Ishwar PURI

The globalization of engineering and the emergence of new technologies present both opportunities and challenges to the engineering profession. Students must be educated with the requisite skills for the global workplace so that they can continually adapt to frequent technological innovations. Qualified workers are required across the world to develop and handle new knowledge, integrate it, and promote innovation. It is essential to create pipelines for such workers through an education infrastructure that is informed about the synergy between the knowledge (intellectual drive), industrial (productive means), and civil (civic and personal well being) societies. Therefore, the stakeholders – universities, governments, private sector and NGOs – involved in the education infrastructure have a visionary function by detecting early signs of change, developing scenarios, real-time assessments, and long-term planning. Since this is well recognized across the Atlantic, transatlantic programs offer natural opportunities to create innovative educational programs. The main obstacles to such transatlantic cooperation lie not in accreditation, credit transfer, differences in degree duration and program structure, but rather involve language barriers and fee structures due to differences in institutional oversight, budgeting and revenue streams across the Atlantic. One method to overcome impediments is by creating collaborative graduate programs that are synergistic with existing institutional teaching and research efforts. Such programs not only increase transatlantic research collaborations, but also train students to communicate in a foreign language by assisting faculty members at the host institution in their teaching activities. They tie international programs directly to the institutional mission, thereby assuring sustainability through alternative sources of funding, specifically developed curricula, and institutional exchange of faculty, e.g., through sabbatical opportunities. It is unclear to me that government agencies fully understand the nature and intent of these innovations. Government policies should be based on the recognition that university resources are limited by existing budgetary streams and reward the ways by which universities leverage public funds to develop and implement new international curricula. While it is a prime beneficiary of such programs, I am far less sanguine about the role of the private sector to provide meaningful funding across national boundaries, since very few successful examples of such support exist. A first step would be to promote industrial consortia that are willing to address these global realities by investing in innovations in transatlantic educational collaborations.

EU Andrejs RAUHVARGERS

The general issue of attracting more young people to studies of science and engineering is a crucial issue for further development of both EU and US. It should however be dealt with at much earlier stages of education than the school leaving year – it is important to promote interest towards knowledge and understanding of sciences and technical subject long before to ensure sufficient numbers of school leavers who are prepared and motivated to study sciences or engineering.

We can expect student interest to participate in transatlantic programmes

- if their undergraduate degree is fully recognized for admission to graduate studies,
- if the credits obtained are fully recognized towards the second degree,
- if the graduate degree itself is recognized for both academic and professional purposes.

Some bilateral discussions are definitely needed to find generalized solutions for recognition of credits between US contact-hour based credit systems and European workload-based ECTS.

To address the above issues European side can offer some tools that have been developed in the Bologna process. This includes learning outcomes – based approach towards curriculum development, recognition practices and joint quality assurance of the joint programs.

If seeking real synergy rather than cooperation only establishing of “genuine” joint degrees and not only double/dual degrees should be aimed at, including a joint curriculum development and ensuring that different parts of curriculum are taught at different partner universities in US and EU, with a joint quality assurance of the program and including staff teaching at several partner institutions.

It can be argued that the added value of transatlantic joint curricula is greater in the case of master's and doctoral programmes rather than in undergraduate studies.

Because of the great differences in funding mechanisms between USA and EU (and, in addition between different EU member states) the issue of tuition fees should be considered as strategic and solutions might be sought at political level.

Topic B: EU-US partnerships to attract young talent

US John GRANDIN

This presentation will focus on the International Engineering Program (IEP) at the University of Rhode Island (URI) and its very active exchange relationship with the Technical University of Braunschweig at both the undergraduate and graduate levels. The IEP began as a five-year undergraduate program, through which students simultaneously complete both the BS in any one of the engineering disciplines and a BA with a major in German, French, Spanish or Chinese. IEP undergrads spend their fourth year abroad, first as exchange students at partner universities and secondly as professional engineering interns for a six-month period at cooperating companies.

In more recent years the IEP has expanded to the graduate level as well, making it possible for students to complete a Dual Degree Masters Program with our German partner, the Technical University of Braunschweig. In 2007, the program extended this model to the doctoral level, enabling students to complete the URI Ph.D. and the Braunschweig *Doktor der Ingenieurwissenschaften* at the same time. The Dual Degree Masters Program has been very popular for German students coming to URI, whereas many obstacles needed to be overcome before American students could participate. At this point six American students have completed the challenging Dual Degree Masters, while several more are in the pipeline, with the first two dual doctoral students in Germany. It too is proving itself viable as a model for providing students with educational depth, global skills, and credentials appropriate for today's global workplace. The presentation will discuss the nature and details of this innovative exchange.

EU Manfred HAMPE

The Bologna process has enabled an assimilation of higher education in Europe that is unprecedented in history. Within 11 years, having started in 1999, 46 countries in Europe will have harmonised their system of higher education, will have established a system of transferring students, credits and grades across borders and will have set up a qualification framework that allows to compare and to recognise academic degrees and non-academic levels of competence. Within this process study programmes had to be completely redesigned. The paradigm shift from a teacher-centered, input-oriented curriculum to a learnercentered, outcome-oriented one has been a boundary condition. Many American universities underwent similar curricular changes in the aftermath of the Boyer report. In effect, American and European universities nowadays share the same philosophy towards the outcome-orientation of the degree courses and the individual modules. A difference not yet resolved is the credit system which is contact hour based in America and workload based in Europe. Outcome orientation on both sides of the Atlantic has enabled us to compare study programmes and to recognise credentials from partner institutions. Recognition of credentials is not to be taken easy; trust is needed, and trust can only develop between partner institutions that know each other well. The Virginia Tech – TU Darmstadt partnership is a good example. We have succeeded in establishing both a Dual Bachelor of Science and a Dual Master of Science degree programme in mechanical engineering. For students it is crucial not to lose time during their stay abroad and to graduate on time.

Topic C: Obstacles to a harmonized transatlantic approach

US David ALLEN

We have been working for several years to develop strong international relationships for our College of Engineering. We attempt to accomplish this via a multi-level approach that consists of the following focuses: 1) all programs are led by a faculty member with strong research ties to a specific institution abroad; 2) connectivity to our partner institution is cemented with federal research and/or educational grants; 3) synergy is produced through exchange of undergraduate students both ways; 4) further synergy is produced through exchange of graduate students both ways; and 5) still further synergy is produced

through exchange of faculty both ways. We do not consider our program successful until we have accomplished all five focuses. Thus far, we have reached all five levels with three partner institutions: 1) Universidade Federal do Ceara (UFC) in Fortaleza, Brasil; 2) Lulea Technical University in Lulea, Sweden; and 3) University of Rouen in Rouen, France. We have also created dual degree programs at the M.S. level with all of these institutions, and we note that they are all loosely interlinked at this point in time. Furthermore, we have reached completion of at least four of these links with Xian University in Xian, China, and Ecole des Mines in Paris, France, and other partnerships are underway. Our most successful program, with UFC in Brasil, has to date exchanged more than thirty students in each direction. Multiple degrees have been awarded at UNL at both the M.S. and Ph.D. level. While we have not to date produced any dual degrees, we are well on our way to producing these as well (at the M.S. level), in particular with our European partners. A focus of this presentation will be to present our progress in constructing these new dual degree programs in engineering

EU André SIGANOS

This presentation will show that institutional brakes are not specifically transatlantic, but global. Nevertheless, in light of the fact that curricula in engineering programs vary greatly within Europe but also between the EU and the USA a common standard would be a great gain: with the same requirements for selection, duration of study, recognition of the necessity to carry out internships and value attributed to PhDs and more or less the same recognition of the title of engineer. This would be the first step towards true transatlantic professional recognition. In this sense, Higher Education Institutions have a great role to play. Exchange programs, bilateral agreements and joint degrees have proven their added value for successful mobility through a combination of two schools' cultures, two countries' cultures and languages, the recognition of academic contents, assessment modes and so on.

But we have to face a new generation of students (consumer students) for whom the benefits of international mobility have to be proven, which is not as simple as it is generally admitted, especially in the current context of great world needs in engineering.

It is the reason why we will underline that great transatlantic programs such as Atlantis, STEP or GlobalE3 encourage the creation of institutional networks. However these programs are insufficiently promoted and we need to ask ourselves whether a top-down public policy has any chance of being really effective without the strong support of Higher Education Institutions and students.