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Engineering education world

World

International students are likely to study engineering

The USA is world leader in the number of foreign students. Figures for 1988 now available from Unesco show 366,000 enrolments in post-secondary education, next is France with 125,000 students, then the USSR with 115,000, Germany 91,000 and Britain with 59,000. The majority of foreign students in the USA and Britain are studying engineering and science. More than half those receiving Ph.Ds in the USA are in engineering. Overseas engineering students are actually essential for US universities because there are not enough American students wanting to do research. Asian students coming to the USA are now comprising 56% of all overseas students. Germany recruits most of its foreign students from Turkey, Iran and Greece, with many of the Turkish students coming from settled families in the country. French foreign students often come from North Africa. Britain takes many students from Hong Kong, Malaysia, USA and Germany.

Europe

Current COMETT round of applications

COMETT—the European Community's programme for Education and Training in Technology—has since 1987 been helping to overcome skills deficits in thousands of European businesses through its aid in university–enterprise collaboration for continuing technical education and internships. The core of the working organizations in this programme are the University Enterprise Training Partnerships—the UETPs. The programme is also strongly supported by the European Free Trade Association countries (EFTA) of which Sweden and Finland are the most active at present. The total number of UETPs has just been raised to 205. In the current round of applications, 863 project proposals were submitted under the call which ended on January 15 this year. Of the 114 proposals for new UETPs, 42 were accepted. More than 6,900 student placements will be financed, which is 38% more than in 1991. A total of 254 projects of short study courses will amount to almost 1300 training sessions; 113 projects of a larger scale involving universities and enterprises in continuing education were also accepted. The projects accepted involve 5,000 enterprises, 1,700 higher education establishments and 2,000 other establishments. Funding is at the level of 36 million ECU (around $50 million) with continuing funding an additional 19 million ECU from the previous year. The biggest sectors funded were in the areas of mechanical technology, environment and materials. The COMETT phase II programme is planned to run till 1994. The future of the tertiary education programmes COMETT, ERASMUS and TEMPUS is not yet certain after that, but with the substantial investments and successes of concepts such as the UETPs it is hard to imagine that some form of follow-up programme will fail to materialize. On the other hand the expected local and state support in parallel financing has yet to show sustaining powers for these efforts. As of now the commission, after assessing the impact of the programme, will probably see to what extent these organizations can sustain themselves and how much individual states will top up funding deficits before deciding on the future.

Computer security—a new effort in education in a key area

One of the many projects approved by the European Commission within COMETT (see above) is an education and training project in information and computer security. A consortium coordinated by the Department of Information and Computer Science at Lund University in Sweden involving enterprises and universities in Sweden, Portugal, France, UK, Denmark and Germany is going to develop and implement courses in computer security within the community and EFTA countries. For further information contact: Professor K. A. Holmberg, Information & Computer Science, Sölvegatan 14A, 22362 Lund, Sweden. Tel: +46 46 107338. Fax: +46 46 104528.

The Europeans and their German
A study conducted by the University of Duisburg has shown that German is becoming the second language in Europe, replacing French with English in an unchallenged first place. The study covered 14,000 recruitment advertisements, which showed that German was required as a language in 20% of jobs requiring a foreign language, whereas 50% required English. French was a requirement in 9% of the jobs. With the opening up of Eastern Europe, German has an increased importance especially in Poland, Hungary and Czechoslovakia, where a traditionally widespread knowledge of German exists. The European educational support programmes for the East could be conducted in English, German or Russian in that order if the language competencies of East and West European partners are taken into account.

Multimedia is on the march
A new extensive study report on the multimedia market by the Prognos market research organization predicts that Europe alone will have a market of 2.5 billion ECU of multimedia products by 1995. The US market is estimated at $6.5–7 billion, more than double that of Europe. A large share of the market is in presentation and sales. It is expected, however, that the education and training market will follow. Engineering training is already being tested in advanced classrooms. The editor recently visited classroom facilities being tested at Boeing Co. in Seattle, incorporating instructor-led multimedia instruction facilities in aircraft maintenance, which are to be introduced with the new Boeing 777 as training packages. These are based on Macintosh computers—the currently most advanced GUI. The study is available from Prognos, Missionstrasse 62, 4012 Basel, Switzerland.

Germany

The vanishing academic and research potential in the new states
Universities and research establishments in former East Germany and in Central and Eastern Europe were, and in most cases still are, overpopulated with academic and other staff, who had to perform within an inadequate infrastructure development tasks that in many instances were commercially already readily available in the West. There were three academies in East Germany with 60 institutes and 32,000 employees. Two of these were also doing engineering research; only 13,000 of these are still employed. Universities are also being slimmed. Out of 104,000 employees, only 60,000 will be retained. Large numbers of researchers will leave industry: out of 74,000 R&D positions only 18,000 will remain. Over half the research-related employees have no professional future. The situation is not much different in other countries in Central and Eastern Europe. Especially in engineering branches such as electronics, where the isolated developments in the East kept university and industry research students going, will face a protracted lean period.

Further plans to restructure higher education
The German rectors' conference (HRK) has decided to allow the 230 universities and *Fachhochschulen* to admit professionals without higher education qualifications for degree courses in their speciality subjects. Admittance will be decided by an admissions test. With a current level of 1.8 million students, the following measures are planned. Studies should be structured so that students can finish their primary studies in the prescribed time limits. Students finishing such a primary phase should be able to assume a professional career, obtaining experience on the job. A second study phase should equip the student for a research or academic career. A continuing education system should enable professionals to acquire special knowledge and skills. The rectors demanded 890,000 new student places in higher education. Of these nearly half should be installed in *Fachhochschulen*. Moreover the continuity of the system needs to be secured by the admission of *Fachhochschule* graduates to higher degrees such as the doctorate. The lack of a continuous structure in German higher education makes it anathema to the fact that two major higher education facilities—universities and *Fachhochschulen*—have no real connectivity between them.

In North Rhine–Westphalia the professors are being 'examined'
As presented in the Personal View in this issue, the thrust for improving teaching quality is coming from the state of North Rhine–Westphalia. DM 15.5 million ($11 million) are being spent this year for quality improvements in teaching, this includes a tutor programme for freshmen, and what is somewhat euphemistically termed 'assessments by students'. The action has now commenced after initial massive protests by faculty and administration. Student assessment is being carried out in the universities of Bonn, Münster, Bochum, Bielefeld and Paderborn. The Minister, however, is dependent on the cooperation of the universities and the professors; there is no 'question of control from the state government in this respect', according to Ms Brunn. In Bochum the results were quite positive for the professors. This is, however, of no help to the students who are studying under unbearably overcrowded classroom conditions.

Information science—declining popularity
A total of 6,400 information science student freshmen will begin their studies at universities in this year's autumn semester. This number of study places is allocated by the ZVS—the country's central placement agency—to applicants from all over Germany. The number of applicants for information sciences has been in steady decline

since it peaked in 1988 with 7,700 applications. Since then the capacity for student intake in the subject has risen from 3,400 per year to 4,800. This still represents a deficit of 1,600 placements which is the gap between the number of admitted freshmen and the number of formally available student places. However, for current German university conditions this is a relatively comfortable situation.

The job market for engineers is becoming tighter
The number of engineering and science graduates out of a job was 27,995 in 1991 for Germany. The number of vacancies registered dropped sharply from 7,024 to 2,800 in the same period. Major areas were mechanical engineering, with 6,800 jobless at the end of September 1991—11% more than in the previous year. Similar figures also apply to electrical engineers, with 6,800 applicants for 1,100 vacancies. The trend is continuing this year. A separate figure given for the new federal states of East Germany reveals that 26,500 engineers and scientists are out of a job in these states.

Production technologies at universities with new focus
Traditional involvement in machine tools only is over and the old names of institutes for machine tools and manufacturing as the research and teaching sectors at German technical universities no longer fully characterize their activities. In the METAV fair in Hannover in May this year universities also had opportunities to show where their current interests lie. The time factor has become an integral concept for the competitive aspects in manufacturing technologies. The Technical University of Hannover demonstrated a dynamic system for parameter adjustments in machine tools based on an image-processing system. Other tools such as lasers are being integrated in CAD/CAM systems for three-dimensional laser machining by the Technical University in München. The Ministry of Research and Technology grants in manufacturing technologies are providing pivotal support in two areas, between now and 1996 in the sectors of total quality assurance and in computer-integrated manufacturing in the new federal states. From 1988 to 1992 the main area of support was for CIM in small and medium-sized enterprises.

Internship quality needs improvement
A new survey of internships in the Berlin area has shown that the improvements in the planning and concept for students spending three or more months in enterprises are desirable. The proper planning of contents and aims needs coordination with the philosophy of the enterprise and the course content of the student. A time and project plan for the student is required in order to maximize integration in the enterprise. An intensive personal supervision with educational input is also desirable. The best results were obtained by those who were either attached to only one department or those who were with a larger number of departments, whereas those who worked in a few departments felt that the internship was ineffective. The remuneration is also an important factor: 50% of the internship students receive less than DM 500 ($350 per month), 40% received between DM 500 and DM 1,000; only 10% get over DM 1,000. These figures are distinctly lower than payments received in the USA or the UK. The study, called Columbus, is obtainable from ECO-interdisziplinäres Wirtschaftforum, Postfach 150464, 1000 Berlin 15, Germany.

Private Fachhochschule
A new private engineering school is being established in Pinneberg in the state of Schleswig Holstein. The school—sponsored by 23 enterprises and the employers' association of the metal and electrical industries—aims at combining the learning experience with an extensive training scheme in enterprises. For Germany a competitive element with the established state-supported *Fachhochschulen* is apparent. It is clear that industry support for the state establishments is hardly available and that at least some enterprises feel that the education provided by the state may not be entirely what they need.

Germany–United Kingdom

New joint degree in electrical engineering
The University of Reading and the University of Kassel have inaugurated a joint degree in electrical engineering. In order to conform to both education systems there will be a Bachelor's degree and a Master's degree, the first degree corresponds to the British requirement, whereas the second corresponds to the German requirement. German students will preferably undergo internships in the UK, and their course results in Reading will be recognized. The same will apply to British students in the other direction. Enquiries to: Gesamthochschule Kassel-Universität, Fachbereich Elktrotechnik, Mönchebergstrasse 19, 3500 Kassel, Germany.

The Netherlands–Germany

Joint studies agreed
An agreement between North Rhine–Westphalia and The Netherlands for joint studies between German *Fachhochschulen* and Dutch *Hogescholen* was signed by the Minister of Science and Education, Anke Brunn (see Personal View in this issue), and Jo Ritzen, the Science Minister in The Netherlands. An initial joint course in areas such as logistics management between the Fachhochschule Krefeld and the Hogeschole Venlo in addition to a business studies course are being established.

United Kingdom

The brain drain is now officially conceded

More than 1,000 Ph.D. graduates leave the UK for the USA each year. This brain drain—still officially regarded as a 'myth' in 1989—has now been openly admitted by the Minister of Science, William Waldegrave. The minister conceded that the moves are career related and that the country is not keeping all the highly qualified graduates it should. A new 'White Paper' should deal with the reorganization of British Science and technology, but may also include new strategies, according to the minister.

In Oxford and Cambridge costs are catching up with tradition

The unique tutoring system in Oxford and Cambridge, where each student gets virtually personal supervision in all subjects, thus keeping an individual pattern of study development closely accompanied by the tutor, is under economic strain. Expensive and time-consuming tutoring methods are to be replaced partly by new computer-based instruction technology. In addition, postgraduate students are to be employed as teaching assistants during summer vacations. Some Oxbridge fellows are worried about the abandonment of the traditional teaching styles, but an increasing number of students and budget limitations will eventually force some reform in style.

Another university—Derbyshire

As polytechnics scramble to take up their university status, another institution is coming up from below—Derbyshire College of Higher Education is also becoming a university. With a strong industrial base in Rolls-Royce, British Rail and Toyota, Derby presents a likely location for a university. Its main engineering-related activities are in materials, with a highly rated research team. A new science and technology block is under construction. The university has 8,000 students, of which 2,500 are part time.

France

The French and their English

The French government is accusing the National Centre for Scientific Research of promoting English as the language in which papers should be published for international recognition. CNRS is accused of affecting the careers of French scientists who do not publish in English. The problem of presenting papers in French at international conferences, where a lot of the audience can only follow with simultaneous translation, is well known. When papers are presented in English hardly any scientist needs the earphones for translation.

Italy

Shaking up the education system

As the crises in European educational systems gradually emerge, one more country with a tradition of system-inherent problems is Italy. A huge number of students is enrolled, for example in the University of Rome 180,000, with only 30% ever finishing their degree courses. The lack of degree-level scientists and engineers is now to be remedied with the introduction of shorter degree courses lasting two to three years, starting in November this year in civil engineering in universities and new educational centres. These shorter courses are aimed at relieving the chronic shortage in graduates as represented by statistics from Rome University.

Russia

Another system is crumbling

With the demise of the political system, the educational system in Russia, which was the example for all Communist-oriented regimes, is also undergoing reform. One of the features of this system was the narrow specializations that engineers used to be educated in, such as metallurgical engineers for the heat treatment of steel, or civil engineers for railways. The system is converting to a 4-year first degree course structure with an extra two years for Master's and research degrees. This will bring the system in line with other European or American systems. The masters degree will be available for quality graduates with research abilities. The old system did not produce the type of graduates needed for a free economy. Also, partly due to lack of modern infrastructure and facilities, a heavy emphasis on theoretical subjects was prevalent.

USA

Price rigging at universities

Universities are on trial for agreeing amongst themselves on levels of financial aid to students. Eight of the universities decided not to contest the charges. The MIT, however, contests that cooperation among universities does not violate the anti-monopoly laws as universities are essentially charities and not businesses. This sounds reasonable but the charges are based on the accusation that due to eliminating price competition in student aid, the amount of aid paid to students was lowered, and therefore it became more expensive for students to attend university. With costs running to $20,000 per year for university attendance, many students depend on such financial aid programmes. Meanwhile MIT has lost the case and students will now be entitled to the 'benefits' of price competition. MIT president, Charles Vest, has warned that the decision will effectively erode the freedom of opportunity to get a college education regardless of income.

Quality of laboratory equipment
A National Science Foundation survey of laboratory equipment facilities at US universities shows that laboratories improved equipment facilities between 1983 and 1989. Excellent facilities were available at 8% of those surveyed, with those reporting adequate facilities increasing from 42% to 51%. In 1983, 50% reported inadequate facilities; this has improved to 41% by 1989. Substantial improvements were reported by computer science departments, 31% reported large increases in lab equipment as compared with only 23% of the engineering laboratories. The report, Academic Research Equipment in Computer Science, Central Computer Facilities and Engineering, can be obtained from NSF, 1800 G St. NW, Washington, DC 20550, USA.

Starting salaries highest for chemical engineers
A survey published regularly by the College Placement Council shows that chemical engineers received the highest starting salaries after graduation with a B.Sc. in 1992. They received an average of nearly $40,000 a year, with mechanical engineers following at $34,500 and electrical engineers at $34,000. At the lower end of the scale are civil engineers with starting salaries of $29,600 per year, mathematicians and chemists were paid less than civil engineers. The council predicts that salaries of civil engineers may rise in the wake of concern for infrastructure and environment issues. Starting engineering salaries the world over vary by a factor of 25 if one compares a salary, say, in Eastern Europe, which may be around $1,500 a year, with US salaries.

Australia

The binary divide is disappearing
As in the UK the divide between universities and colleges of advanced education is being eliminated. The last institutions to obtain university status are the Royal Melbourne Institute of Technology and the Swinburne Institute of Technology. While Swinburne is retitled as university, RMIT retains its name, which it considers as the Australian equivalent of MIT in the USA. This completes the change from 19 universities and 60 colleges of advanced education to a new total of 38 universities, following affiliations and amalgamations of institutions. Heads of departments now have professorial status, and as in the UK the financial divide that existed between the universities and advanced education establishments will disappear. As is also usual in such circumstances the 'upgrading' is accompanied by resentment from old university staff of the new 'inflation' in professorial titles. Another accompanying phenomenon of this reform is the possibility of a lesser emphasis on vocational and technical education in the new universities. This aspect should now be taken up by colleges of technical and further education.

Selling education in Asia
Over 5,000 students are studying for Australian degrees outside Australia, and the numbers are increasing. The Victoria University of Technology offers a graduate diploma in computer science given to an oversubscribed student body at Hong Kong Polytechnic. Monash University and the University of Sydney plan to set up campuses in Malaysia. Sydney is putting up a A$30 million International Centre in Penang, offering courses in engineering, economics and business; 3,000 students are expected by 1994. The Malaysian government encourages these schemes in order to reduce the financial strain of support by foreign exchange for students studying outside the country.

Brazil

You need an authorization for an authorization to photocopy
Hard times have descended upon universities in Brazil. Spending cuts are the order of the day. The University of São Paulo has introduced a savings measure to limit the number of photocopies by introducing an authorization procedure requiring information on what the photocopies are for and why. In order to initiate the procedure a form was produced and photocopies were distributed to all staff.

Conferences

4th Annual Convention and Conference, 13–16 December 1992
Australian Association of Engineering Education
University of Queensland, Australia
Contact: Conference Secretariat, University of Queensland, Adelaide, Australia. Tel: +61 7 3657100. Fax: +61 7 3657099

Project-organized Curricula in Engineering Education
SEFI—The European Society for Engineering Education, 5–7 May 1993
Engineering College of Denmark, Copenhagen, Denmark
Contact: Ole Vinther
Engineering College of Copenhagen
Hoerkaer 12A
2730 Herlev, Denmark

International Conference on Electronics Higher Education, 7–9 June 1993
University of Electronic Science and Technology of China, Chengdu Sichuan, China
Contact: Professor Zhao Shan Zhong
610054 Chengdu, Sichuan, PR China
Tel: +86 028 333312 2320. Fax: +86 028 334131

American Society for Engineering Education, 1993 Annual Conference, 20–24 June 1993
University of Illinois, Champaign–Urbana, IL, USA
Contact: ASEE, Conference Department, 11 Dupont Circle, Washington, DC 20036, USA
Tel: +1 202 986 8530

SEFI—The European Society for Engineering Education, 1993 Annual Conference, 28 June–1 July 1993
Lulea University of Technology, Sweden
Contact: Ms Elisabeth Johnsson, Conference Secretary
CENTEK Lulea University of Technology, 95187 Lulea, Sweden
Tel: +46 920 91322. Fax: +46 920 99020

Eighth World Conference on Cooperative Engineering Education, 30 August–3 September 1993
Dublin, Ireland
Contact: Conference Administrator
Dublin City University, Dublin 9, Ireland
Tel: +353 1 7045424. Fax: +353 1 7045505

Second East–West Congress on Engineering Education, 20–24 September 1993
Technical University Lodz, Poland
Contact: Z. Pudlowski, Electrical Engineering, University of Sydney, Sydney, NSW 2006, Australia
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Computer Aided Engineering Education, 22–24 September 1993
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