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Engineering education world

Contributions are invited for this feature. News items on policies that concern the engineering education world, new courses and curricula either of a unique nature or of international interest, new innovative laboratories and concepts, funding news for engineering research projects involving international participation, special international continuing education courses and news, industry–university interaction, engineering faculty news, and developments in engineering education of international interest. Please send news items and conference information to the Editor-in-Chief. Public relations offices of universities and human resources divisions in industry are requested to contact the Editor with news items concerning engineering education and training.

World

Fee or free—the question of university fees is universal

The fee structure for students has been static for many years. Now there are signs of a push for changes. Several factors are responsible: the reform of the former communist countries, the world recession and the inflation in student numbers. The proportion of students seeking higher education in the industrial countries has typically risen from 5% to 35% in the past 30 years. The pressures of the recession and the numbers are relatively obvious; the fact that even former communist and other still non-democratic-capitalist (*sic*) countries such as China are setting an example in the institution of fees is a new factor. Up to now countries charging practically no fees include **Denmark**, **Finland**, **France**, **Germany**, **Greece** and **Norway**, whereas universities in the **USA**, **Japan** and **Spain** depend on fees for at least partial support. In other countries such as the **United Kingdom** and **Italy** a nominal selective fee structure exists. In almost all non-fee countries the debate on fees has been triggered on whether, and how. With annual costs of $25,000 at top universities in the **USA** protests over exorbitant tuition fees have been rocking the system. The following is a representative summary of the fee situation.

USA—Fees at **Yale** are $18,600 and subsistence $6500 per year. This implies parents earning in the $100,000 per year bracket. Fees at state universities are subsidized, and therefore lower; for state residents in the California system they are $4000 with subsistence about the same everywhere. President Clinton has been considering some break intervention to stop rising fees, as parents complain that university attendance will become less than a universal privilege with current developments continuing. As yet the outcome and application of such intervention by the government remains controversial.

France—Only a small contribution towards the financing of higher education is made by French students. With an increasing number of new private institutions of higher education there is some support from industry, with the rest coming from student fees. Student subsistence is supported by state aid with less than 20% of the students receiving grants of varying amounts. Students who receive grants pay no tuition fees, which are symbolic anyway, amounting to 640 francs per year, which is equivalent to a week's subsistence.

Germany—With the Science Advisory Board (Wissenschaftsrat) making unpleasant noises in the direction of selective fees for long-term 'parking' students having initiated a wave of student protests, the issue has been shelved for the time being. With a large drop-out ratio, and 60% of the students having part-time jobs, the fees dilemma is unresolved. As in France, industry is beginning to support some private tertiary institutions, especially at the Fachhochschule, or professional training

college, level. The state bears the brunt of higher education financing—any changes in the system involving fees will under present circumstances have to lie low, unless a change in the political climate occurs.

China—Surprisingly, the Chinese have had a different attitude towards fees. For example, even in the 1980s it was considered normal for students to pay for their industrial training. Universities have been granted a measure of autonomy in determining fees in 1992. By the year 2000 up to a third of university costs will be met by student fees.

India—As reported in this journal (Vol. 9, no. 3) the University Grants Committee has recommended introducing fees for foreign students. Although this will make no substantial contribution to universities, there is speculation that fees for domestic students will be raised to provide a financial boost to the universities.

Portugal—A war on fees has been raging between the government, students and academic institutions. Claims that the high drop-out rate is the result of practically free tuition have resulted in the institution of substantial fees, but student boycott has made implementation of these fees difficult. The stick-and-carrot method has been tried by the government by associating quality requirements and infrastructure improvements with the introduction of higher fees.

Australia—Free until 1985 the Higher Education Contribution scheme has been in effect since 1989. Fees have been introduced gradually, starting with an admission charge of A$250 in 1987. In 1989 students were asked to cover 20% of tuition costs. Loans are given to students who need to repay them after obtaining work.

New Zealand—Fee increases are imminent with students paying around NZ$1800, to be raised by an average of 35%.

CIS—Russian universities charge up to 30,000 roubles per student. The situation in other CIS states is not yet settled.

South Africa—Up to now the white-dominated university population has been accustomed to paying fees of an average of £1250 per year. The income of the 21 universities has been mostly from state subsidies with 16% from fees, 13% from contracts and 11% from investments. With the increasing number of black students a new student loan system is being introduced by the government in order to alleviate the financial situation of the black student population.

Europe

Vocational education of 18 year olds—German-speaking countries top

A study published by Professor **Alan Smithers** of Manchester University's Centre for Education and Employment reveals differences in educational attitudes between the Anglo-Saxon countries and the continental systems. These differences are accentuated by the low status of apprenticeship training in the United Kingdom. Professor Smithers criticizes the new National Vocational Qualifications based on proficiencies in practical tasks and the General National Vocational Qualifications as an alternative to A-levels in the UK. Compared to German apprenticeship education, the new British schemes have underdeveloped theoretical contents. In Germany the number of 18 year olds undergoing education is a mixture of those undergoing apprenticeship training with a work–education mix, and a number of students still in secondary education—currently ending between 19 and 21 years of age. As we reported, an increasing proportion of young adults undergo apprenticeship training before joining universities as a fallback safety net: around 30% of university entrants leave higher education before obtaining a degree. The attitudes towards practical qualifications are exemplified by the allocation of maintenance work to specially qualified teams in the UK as against its being routine job for all machinists on the continent. Similarly, in the garment industry German workers can reach an efficient working speed within three days on a new garment while British workers usually take three weeks. The report urges changes in the education schemes to bring the UK more into line with German and Swiss conditions. Figure 1 shows the comparative situation in vocational and other educational activities of 18 year olds for various countries. The report *All Our Futures—Britain's Educational Revolution* by Professor Alan Smithers is available free from Channel Four, PO Box 4000, London W3 6XJ, UK.

Less bureaucracy promises

The fourth Framework programme for the support of science and technology has made its appearance, and needs to be approved in several stages before coming into effect. The programme envisages a division between academic and vocational strands, but with universities essentially also eligible for applications in the vocational training areas. **Antonio Ruberti**, the commissioner in charge of science and technology, promised a simpler application procedure in the future. Many complaints of too much bureaucracy in the present procedures have been registered. Professor Ruberti also defended the inclination to support more of the peripheral countries than the well-developed ones. Greece has a relatively high support quota because it spends only a fraction of the relative amount on science and research as compared to France or Germany. Ruberti cited successes in this context, such as the establishment of a biotechnology research centre in Crete.

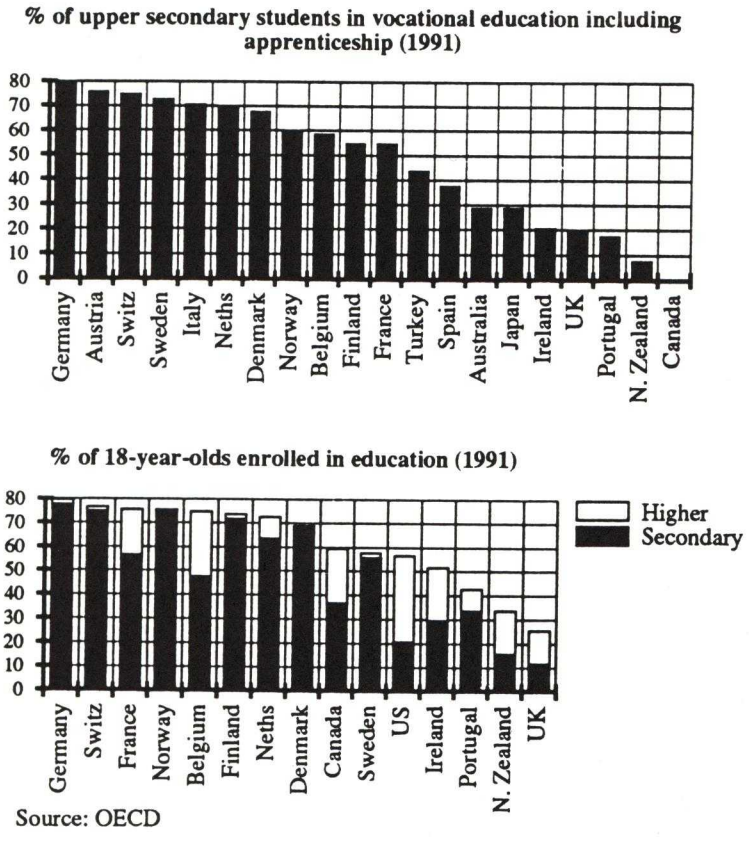

Fig. 1. Vocational and other education of 18 year olds.

Germany

Record student numbers amid controversies

The German Rectors Conference (HRK) president **Hans-Uwe Erichsen** has voiced strong opinions against those who advocate a reduction in students seeking higher education. This is in the face of a record number of new students attending German institutions. A study by the Ministry of Education and Science predicting that in the year 2010 there will be 800,000 superfluous university graduates and 250,000 redundant Fachhochschule graduates, whereas there will be a shortfall of 2.3 million vocationally trained professionals, has been strongly criticized. The 1.864 million students currently attending higher education institutions represent an all-time high. It needs to be remembered that predictions on developments in student numbers and demands on higher education have a notorious record of unreliability. Institutions of higher education have been running for years under so-called 'over-capacity' conditions entailing a moratorium on hiring university staff. It was predicted that these conditions would be temporary and they should have subsided long ago. Events have shown that the contrary situation has developed.

Patent registrations as indicators of economic strength

Joblessness is not a function of structural problems in industry alone, but is also related to innovation potential. This is, according to Professor **Erich Häußer**, president of the German Patent Bureau, one of the factors in the current recession of the German economy. The German economy has been resting on its laurels for too long and has not faced up to the signs of rising competition from the USA and Japan. The number of patent registrations has declined from 45,000 per year in the 1950s to 29,000 in the 1980s. Since then there has been a steady rise to 35,000 in 1993. In Japan the number of patents has risen from 213,000 in 1981 to 350,000 in 1992, and in the USA from 60,000 in 1983 to 100,000 in 1993. The number of patents registered by university professors is dwindling.

Personnel chiefs for shorter study times

Company personnel managers of 700 enterprises expressed their wish for shorter university study periods, according to a survey conducted by the Institut der deutschen Wirtschaft in Köln. The measures recommended by industry are an increase in academic personnel, a streamlining of study guidelines, and an increase in practical training of students. They are therefore in favour of co-operative and internship models to be incorporated with the study periods.

Keep the rivals at bay

The Berufsakademie educational establishment, which closely combines practical experience with studies, and is partially supported by enterprises, is raising its voice in the direction of becoming another academically accredited type of institution. The state of Schleswig Holstein is planning to locate this type of institution within the tertiary system for possible subsidies. The nearest neighbour in the higher education hierarchy is the Fachhochschule. These are protesting against the possible incursion of the Berufsakademie, which they consider unqualified for the status of an institution of higher education. As usual, the institutions considered to be at a lower academic level strive for a higher level on the ladder, and are pushed back by the competitor sitting on the next rung, who in turn strives to reach a higher rung.

United Kingdom

Changes are on the march again

More than any other industrialized country, the United Kingdom has been active in proposing and implementing changes in higher education for engineers and others. Now, **Sir John Fairclough**, chairman of the Engineering Council, has been discussing a document that proposes restructuring the professional engineering institutions, which are responsible for the chartered engineer status. With more than 40 bodies, these professional institutions are fragmented, and the proposed unification under a kind of federal system, is (of course) a matter of hot discussion. The engineering organizations are also destined to be more firmly bound to the Engineering Council itself. A second document, *Review of Engineering Formation*, looks at the future of engineering education with a view to improving the standing of engineers in the UK, whose status suffers from the loose designation of the term engineer (see our editorial in Vol. 9, no. 2). Sir John states that 'Engineers are no longer building a prototype and then throwing it over the wall to let someone else figure out how to make it'. The engineering profession now is a more horizontal occupation akin to a total quality concept, and engineering education should provide a wider base for global responsibilities. Engineers need more marketing, and business knowledge which will prepare them for leading roles in industry.

New Zealand

Not to be missed—here too the name game

The Auckland Institute of Technology feels that it will have better chances in the tertiary education market if it is renamed the Auckland University of Technology, while retaining its polytechnic status. The institute is primarily a teaching institution with about a third of the students going for degree programmes, and the rest gaining a diploma or certificate title. The chairman of the vice-chancellor's committee, **Albert Brownlie**, feels that a polytechnic cannot be a university as well (he may not have heard of the Polytechnic University of New York). Among other warring factions there was an unsuccessful attempt at blocking a name change from the Carrington Polytechnic in Auckland to the Unitec Institute of Technology—apparently Unitec smelling too much like university of technology. Apparently if you invent a clever name you get a disguised uplift.

China

Sell your research privately—a new market economy trend

Chinese students and researchers are now selling their technological research in auctions. Since auctions first started in Shenzhen the practice has spread to other Chinese cities including Beijing, Xian and Shanghai. Industries local and foreign are eager to snap up the results of university research. As yet there are no binding laws to prevent this phenomenon. Inventions are sold in the areas of materials science, microelectronics, chemicals and bioengineering. An example is a sale of a technology for magnetic powder preparation by a doctoral student from the China Chemical Industry for around $350,000 in Shanghai.

Conferences

Learning Organisations Innovations-Initiatives
16–18 May 1994
La Hulpe, Belgium
IBM International Education Centre
Chaussée de Bruxelles 135, 1310 La Hulpe
Belgium
Contact: Pierre de Potter
Tel: +32 2655 5803 Fax: +32 26555812

First Eurocad Forum: Inaugural Meeting of European Lecturers in CAD
16–18 June 1994
Bologna, Italy
Contact: Eurocad Leicester UK
Tel: +44 533522408 Fax: +44 533 522028

ASEE Annual Conference
26–29 June 1994
Edmonton, Alberta, Canada
Contact: American Society for Engineering Education, 1818 N St., NW, Washington DC 20036, USA
Tel: +1–202 3313500 Fax: +1 202 265 8504

IEEE First International Conference in Multi-Media Engineering Education
6–8 July 1994
Melbourne, Australia
Contact: Dr M. Aldeen, Department of Electrical and Electronic Engineering, The University of Melbourne, Parkville, Victoria 3032, Australia
Tel: +61 3 3447298 Fax: +61 3 3446678

Calisce '94: Computer Aided Learning in Science and Engineering
31 August–2 September 1994
Telecom, 46 rue Barrault, 75634 Paris Cedex 13, France
Contact: Jean-Louis Dessalles
Tel: +33 145817870 Fax: +33 1 45813119
e-mail dessales@enst.fr

Visions and Strategies for Europe: Joint SEFI and IGIP Annual Conference
21–23 September 1994
Czech Technical University, Prague, Czech Republic
Contact: Jan Pozar, Department of International Relations, Zikova 4, 16635 Praha 6, Czech Republic
Tel: +42 2 332 3465 Fax: +42 2 311 9692
e-Mail seig@vc.cvut.cz

3rd European Forum for Continuing Engineering Education
9–11 November 1994
Vienna, Austria
Contact: Dr Franz Reichl, Vienna University of Technology, Gusshausstrasse 28, 1040, Vienna, Austria
Tel: +43 1 58801 Fax: +43 1 5054961
e-mail Internet. reichl@email.tuwien.ac.at

The Development and Role of Women in Technology
21–24 September 1994
Beijing Institute of Technology
Beijing, China
Contact: Professor Li Shizhi, Beijing Institute of Technology, PO Box 327, Beijing 100081, China
Tel: +861 8416688 Fax: +86 1 8412889

Fourth Triennial International Conference of the Association for Engineering Education of South East Asia and the Pacific
13–16 November 1994
Lae, Papua New Guinea
Contact: Dr Nimal Subasighe, Department of Mining Engineering, PNG University of Technology, Private Mail Bag, Lae, Papua New Guinea
Tel: +675 43671 Fax: +675 457534

Third UNESCO World Conference on Engineering Education
14–18 November 1994
Cairo, Egypt
Contact: Dr Saad M. El-Raghy, Faculty of Engineering, University of Cairo, Cairo, Egypt

Fourth World Conference on Engineering Education
15–20 October 1995
Minneapolis-Saint Paul MN
Minnesota, USA
Contact: Dr E. R. Krueger, William C. Norris Institute, 245 East Sixth St., St Paul, MN 55101, USA
Tel: +1 612–225 1433 Fax: +1 612 225 1241