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Engineering education world

Contributions are invited for this new 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.

European Community

Research and training policy realignment

The popularity of the European Community amongst its member populations is on the decline—and one could possibly view this trend similarly to a trend cycle in the stock market. **Antonio Ruberti**, the vice-president of the EC in charge of research training and education, reflects that the new document being submitted to the Community on these matters considers scenarios that take into account the financial straits of the member states and the revised growth projections in view of these influences. Nevertheless, the Community plans to spend 13.1 bn ECU (over $15 bn) in these areas from 1994 to 1998 in its fourth Framework program. The Community will be spending 2% of its gross national product for these programs. The USA spends 2.8% and Japan 2.9%, but EC member states have additional national programs which added to the Community's spending would put the Community ahead in public spending for education and research. The continuing emphasis of the new Framework program on information technology and its services, amounting to a third of allocation requests, is defended by Ruberti as a necessary measure in order to keep up with developments in the USA and Japan. A point of disharmony within the EC are the Joint Research Centres which will be getting 9% of the total budget. Holland and the UK, in particular, argue that these centres are too far removed from market forces and do not even comply with the Community's own guidelines for contracting out 15% of work to third parties.

Germany

Studying till death do us part

A 58-year-old student, **Werner Stania**, has been registered at the University of Frankfurt for 27 years—equivalent to 54 semesters—and may hold the record for the longest study time at a Germany university. The student symbolizes a new campaign against everlasting students, and overlong school times. Apparently he is only partly dependent on the tax payer for getting him through school as the lucky student is also supported by a wife who clearly values education. Stania claims that he has been badly advised by student services since he first registered in 1955, as he was told to study everything and concentrate on nothing. Stania is already writing his doctoral dissertation on 'Lemonosow's corpuscular theory', which he plans to finish this year.

Young university with high ambitions

The youngest technical university in Germany is the TU Hamburg-Harburg established in 1978. It has 2300 students, 1000 staff and 80 full professors. The establishment of a university company for

contract research is unique in Germany. The company for the acquisition and implementation of contracts has been set up to ease bureaucratic impediments for research work. The university has more than 100 industrial co-operation contracts for research. The new president of the university, **Hauke Trinks**, a physicist with personal experience in astronaut training with NASA, aims for a top-quality university (avoiding the politically taboo expression 'élite'): with examination failure rates of up to 50% in the first years, this aim could be achieved through the back door. The equal opportunity of entering the mass university system finds its own corrective mechanisms.

Ranking wars

The Rector of the Technical University of Berlin, **Manfred Fricke**, was appalled when his university was ranked 21st out of 33 German language technical universities surveyed by *Manager* magazine. The survey information was supplied by 500 top companies, according to the magazine. A repeat survey was launched by the university and sent to 500 companies; 200 returned the forms; only six said that they had also been surveyed by the magazine. It is apparently unclear now how the original survey obtained its results. According to the rector, many companies said they were pleased that someone was trying to trace the sources of the results and that they were not in favour of such surveys. TU-Berlin is now asking the university rectors' conference (a permanent rectors' and presidents' council in Germany) to inaugurate their own ranking actions. Rankings by the magazines *Spiegel* and *Der Stern* have been in the news recently, and the validity of these surveys has been openly questioned. In the case of the *Spiegel* survey, students and professors were asked to rank universities—in this case companies were not asked—which revealed a clear dichotomy between the views of the professors, who were asked where they would send their children, and the current students. The professors preferred the traditional, older universities, whereas the students were happier with newer and lesser known institutions. For example, the relatively unknown **University of Düsseldorf** unexpectedly came out on top in the *Spiegel* survey.

Stop learning foreign languages—relief is on the way

The need for instant translation is increasingly felt, especially in Europe. German scientists are developing—with massive financial support—an instant translation device, named 'Verbmobil'. Initially the project—funded to the tune of DM 200 m. jointly by the federal government and the European Commission—is aiming to translate from Japanese and German into English. Initial versions of 'Verbmobil' should be ready for testing translation of fragmented German into simple English in 1994. The sentences will be limited to those with a single verb. The current projection for the cost of 'Verbmobil' to be available by the end of the century is DM 10,000. The developers are the German Research Centre for Artificial Intelligence under Professor **Wolfgang Wahlster**.

A non-existent energy technology course

The Fachhochschule Köln has been offering a post-graduate course in energy technology since 1984. But no one has graduated yet. The course, which offers lectures that are part of the general curriculum with no specialist subjects, is apparently being used by students as a 'parking course', i.e. graduates with degrees in electrical engineering, for example, register for the course in order to keep up their student status and privileges while they are looking for a job. A Center for Energy Technology, which should have been established, is still a ghost. The rector of the school, Professor **Joachim Metzner**, concedes that a graduation certificate from this course is not worth the paper it is written on, or for that matter would be written on.

Signs of crisis in the dual education system are mounting

The prestigious vocational professional education system is showing weaknesses not envisaged only a short while ago. In the old German states openings for 125,000 vocational professionals remain unfilled, and the need for trained professionals cannot be satisfied. Several developments contribute to this situation. First, with the increasing number of young people qualified for higher education, interest in manual skilled work is on the decline. A second factor is the increasing costs of in-house training. An apprentice in a larger company costs the company on average $20,000 a year—a total of $60,000 over the whole training period. Companies are increasingly recruiting qualified engineers and give the six-month trainee programs costing a total of only $20,000. Consequently, positions formerly occupied by skilled, professional workers are being taken up by engineers, many of whom have anyway already had a vocational training before studying. Predictions on the future demand for professionals and engineers are debated between different sources. Whilst one study claims that by the year 2010 there will be a large increase in the demand for professionals and engineers and a decline in unskilled labour, others claim that widespread unemployment amongst academics will prevail. It seems that analyses of future situations are difficult in the current economic situation, and depend on whether a study is sponsored by employees' associations or by the employers. Readers may decide for themselves which source predicted what.

United Kingdom

An Innovative university

The **University of Salford** is becoming a centre for innovative developments. An electronically

controlled walking system for paraplegics has been demonstrated by Professor **Jack Edwards** of the university. In paraplegics the brain commands for walking cannot reach the leg muscles because the nerve connections to the muscles have been cut—usually due to an accident. The system is based on a small microprocessor-controlled unit. The unit is implanted below the belt line and walk commands are transmitted by hand to a small transmitter mounted on a belt. The transmitter sends signals to electrodes connected to the leg nerves, which then activate the muscles for walking.

. . . which is also strong in technology transfer

The **University of Salford** has a technology transfer system that works. The system works through a company structure, which ensures that two of the major problems with contracts from outside universities can be resolved. One is the notorious unreliability of university contracts regarding time of completion, the other is the remuneration structure, which is difficult to administer through a university structure. Companies settle at the Salford University Business Services premises, which jointly with Salford University Business and Enterprises Ltd are subsidiaries of a holding company. The 130 companies involved also provide the university with professors to teach part time and work part time for the companies. All this tends to create an industry-friendly campus, which as reported elsewhere (see China) is part of a trend that may draw criticism regarding the purity of academic institutions and a possible servitude to mammon.

University in business

The **City University** has sold its subsidiary in Portsmouth-City Technology Ltd, which designs and produces gas sensors for industry. The £20 m sale is going to be used for building projects and an academic fund.

USA

New directions for engineering education

The needs of industry for graduates who are ready to work rather than graduates who need to practice is starting to reshape academic practice in engineering education. The areas tackled by top-line institutions include: students working in teams rather than as lone wolves clamouring for the best grades; rethinking the approach to mathematics for engineering; greater integration of management studies. Some of these initiatives also generate more involvement from industry as well as being sponsored by the National Science Foundation's engineering education coalition programme. For example, **Sun** computers is working together with **Cornell University** on developing courses based on standard computer programs combining civil, architectural and structural engineering. A program at the **University of California, Berkeley**, includes practical electronic projects such as designing a VCR without the notorious programming problems. Such design classes are taken up by a class mix of juniors and seniors, sidestepping prerequisite hurdles. Some of the other developments **Carnegie Mellon University** has started courses that integrate mathematics teaching with engineering, and has integrated electrical and computer engineering into a single degree program. The **University of California, Berkeley**, is offering a new **mechatronics** program (see **Yamazaki and Miyazawa**, A development of courseware for mechatronics education, *Int. J. Engng. Ed.*, **8**(1), 61–70). The **University of Michigan** has developed a new master of engineering program together with the business school to incorporate instruction in management skills for engineers. All this is creating problems between the universities and the Accreditation Board for Engineering and Technology (ABET), which has a stricter recipe for curricula in engineering which prescribes that students take a specific number of engineering, science and mathematics courses. Universities are determined, however, not to be sidetracked from their new course visions. Carnegie Mellon engineering dean **Stephen W. Director** maintains that the university is going to stick to its reform plans regardless of accreditation. ABET is now considering a re-examination of their accreditation criteria.

Changing times for job seekers

Even graduates of the most prestigious institutions are feeling the pinch of recession when seeking jobs. Out of 225 students graduating from the **California Institute of Technology** (Caltech) in Pasadena, only six have job offers from the traditional employers in the area—McDonnell-Douglas, Northrop and Lockheed. This situation is all a result of the dearth in defence orders, which has hit these industries particularly hard. Graduates of Caltech, who have the highest SAT entrance level scores, are now seeking other outlets. A relatively large number are going to attend medical school, and over 50% are going to attend graduate school.

South Africa

Can we learn from medical education?

The medical education system has for many years been dealing with education in a service industry which is closely associated with responsible practice and a need for constant reeducation. The World Conference for Medical Education, held in Edinburgh in August, is dealing with such areas as medical curricula, promoting independent learning throughout every doctor's career, and training in the community as well as in teaching hospitals. Doctors require a practical education as well as a knowledge-intensive education. Teaching methods and educational technology for doctors have been intensively developed. Can we draw parallels—especially now that engineering practice is

becoming more service and social responsibility oriented? Thinking about such a possible education idea link has been prompted by a proposal submitted to the editor by Professor **Meyer** of the teaching unit of the **University of Cape Town.**

Technikons upgraded

Technikons—similar to the old polytechnics in the UK—are to be upgraded to degree status. The 15 institutions in South Africa have more than 100,000 students, 62% of whom are white. This move is similar to a world-wide trend to upgrade diplomas granted by secondary level institutions to be equivalent to qualifications awarded by tertiary level institutions. The trend started in the 1960s when technical colleges in the UK became polytechnics. The recent change of polytechnics to universities seems to continue the trend of upgrading. The nagging question is: is a gap being created below the level of these institutions—or is it all just a name change?

China

Chinese universities are adjusting to market forces

Beijing University is experiencing for the first time undersubscribed classes. The background is that the universities are out of tune with the market and do not produce practically skilled graduates. An increasing number of school leavers prefer to study practical skills in vocational and technical colleges. The university is now offering 165 new speciality courses which are more market oriented. University businesses, with nearly 300 companies, as well as consultancy work, are also mushrooming. Although arguments are being put forward that an increasing market orientation may be counterproductive to constantly changing market needs, China has a tradition of development and production facilities on a pilot scale at institutions of higher education that persisted even through the 'Cultural Revolution'. Colleges and universities are actually used to earning additional cash with special products ranging from zone-refining equipment to beer bottle caps. University and college presidents could fund their own institutions building and staff developments with the profits, which relied on the partial independence in the form of 'units' to which everyone in the institution belongs.

Hi-tech research fever

Chinese efforts in transforming high technology into commercial products are yielding results. Under a 10 year plan, 12,000 high-technology enterprises will be established. Research institutes and universities have been involved in over 40% of projects within the Torch program which started in 1988, generating over $4 bn in revenue this year. The staff working in independent research now numbers 500,000 and comes mostly from former government institutions.

India

Foreign student fees raised

The Indian Institutes of Technology—the group of five prestigious technology education institutions in India—are to raise fees for foreign students by 100% from $2000 to $4000. The raise, decreed by the Ministry of Education, is hardly going to help the finances of these institutions as the number of foreign students is small. This increase stems from criticism that these institutions, which are highly subsidized, train highly qualified technical personnel who then disappear overseas (see also forthcoming special issues on **Engineering Education in India**). The move will not alleviate the situation because Indian students only pay $400, which hardly contributes to the actual costs.

Conferences

4th International Forum on Technology Management
Berlin, Germany
18–20 October 1993
Contact: Anne Heaton
Jupiter Consortium, 93 Hampton Rd,
Hampton Hill TW12 1JQ, UK
Tel: +44819779033 Fax: +4481043 3763

CBLIS—Computer Based Learning in Science
18–21 December 1993,
Vienna, Austria
Contact: P. Nobar
CATU, University of London
Mile End Rd, London E1 4NS, UK
Tel: +4471 975 5555 Fax: +4471 975 5500

VR '94
Virtual Reality Forum, Applications and Trends
10–11 February 1994
Fraunhofer Institut, Nobelstrasse 12, 7000
Stuttgart 80, Germany. Contact: M. Wapier.
Tel: +49 711 9701307 Fax: +49 711 9701399