

# 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.*

## Switzerland

### *Higher education reform—trend to more central controls?*

A more centralised way of planning Switzerland's universities has been proposed by the federal government and is being debated by the Swiss parliament. Legislation based on proposals from the federal office for education and science and the Swiss Science Agency is before parliament, with a final decision expected in May 1999. The proposals have the conflicting objectives of simultaneously increasing co-operation and competition between universities. Crucially, they pave the way for a new deal between federal government and the cantons, and the creation of a new Swiss University Conference with decision-making powers.

In line with the country's commitment to devolved democracy, Switzerland's ten main universities have historically been cantonal rather than federal institutions. About 90,000 students are enrolled at the ten universities and two federal institutes of technology. The increase in recent years has levelled off after steady growth between the mid-1960s and the early 1990s. Numbers increased by 18 per cent over the ten years from 1985–95 but there was no need to introduce a *numerus clausus*. Swiss universities have avoided the overcrowding seen elsewhere in Europe,

remaining modest in size. Zurich is the largest, with 20,000 students and Geneva second, with 12,000. Research performance is strong—surveys of citation indices place it high in international league tables. So why a shake-up of a system that seems to be working well and attracting a strong inward flow of international students—about one-fifth of the total, with 37 per cent of all postgraduates from overseas?

**Hans Beck**, president of the Swiss Universities National Planning Commission, said that the government was concerned at 'excessive democracy' in decision-making and the slow rate of transfer of technology into the economy. There is also the consequence of the 1992 referendum on European Economic Area membership, which might have meant Switzerland's formal exclusion from schemes such as Erasmus, the EU's student mobility program, and EU research initiatives. Pragmatically, the Swiss government simply encouraged universities to become 'silent partners', underwriting the direct costs from federal funds, and concluded bilateral agreements with its neighbouring EU member states. Slightly more Swiss students take part in Socrates and Leonardo programs than flow the other way. The cost to Switzerland of the transitional arrangement has risen from SFr4.4m (£1.9m) in 1996 to SFr6m in 1998.

Overall, as in other countries, there is concern at meeting the costs of growing demand against a background of unspectacular economic performance. The government insists that future federal subsidies should be based on four-year development plans, and at its instigation in 1996 the universities drew up a strategic plan for the ensuing ten years. This was followed in 1997–98 by a four-year plan for 2000–03. Approximately a fifth of the operating costs of the cantonal universities is met by the federal government, which also pays investment grants covering 35–60 per cent of construction and equipment costs and for student exchanges and academic mobility with the rest of Europe, including the EU. Student fees are about SFr500 a semester. Collaboration is already being explored, with harmonisation of courses between Berne, Fribourg and Neuchatel, while Geneva and Lausanne are aiming for closer collaboration short of a merger. Student numbers are to increase by 20 per cent between 1998–99 and 2005. Federal funding, which is likely to grow only slightly, will be tied to outputs such as graduate numbers and volume of research. It will encourage greater competition in research, while rewarding local and regional networks.

An Institute for Quality Assurance is also promised. Swiss ministers and officials were in the Netherlands this month to discuss the mechanisms in place there that tie quality to funding. There are already signs of some resistance—the Swiss rectors have produced counter-proposals to the quality assurance regime. But it is unlikely that the legislative package can be dumped. One element is a refined fee-adjustment scheme under which cantons without universities meet the costs of their students in cantons with universities. It is a three-banded scheme that recognises the varying costs of library-based, laboratory-based and medical courses. The rectors want a ‘new blood’ scheme for faculty, planned to create 300 substantive posts in the period 1992–99, a third of which are for women, to continue.

### Moldova

#### *Moldova first of the former Soviet republics to charge tuition fees?*

Moldova, no longer able to finance higher education exclusively from its state treasury, is now charging tuition to one-third of the students at its 15 public postsecondary institutions. The country is probably the first of the former Soviet republics to impose such fees, a radical departure after decades of free higher education. Under Communist rule, tuition was viewed as a bourgeois injustice. Across both Eastern and Western Europe, soaring rates of spending on higher-education systems, which in recent years have experienced almost unchecked enrolment growth, have caused more and more countries to move closer to imposing fees. Thus far, the only country

to have done so is Britain, where universities now charge students annual tuition fees of about £1000. However, there, as in many other countries, the idea of such fees is still highly controversial, and has provoked student protests. Not so in Moldova, a small, poor, agricultural country of 4.5 million people between Romania and Ukraine. Imposing fees ‘was forced on us by circumstances,’ says **Stefan Tiron**, an official adviser to the Minister of Science and Education. Local observers say that the public has generally accepted the idea of fees, as people have come to feel that something had to be done to prevent a collapse of the higher-education system.

State support for higher education has steadily declined since Moldova became independent in 1991. Today, the state is able to provide free higher education to only about half as many students as it did at the start of the decade. But the total number of postsecondary students in Moldova, 50,000, has remained about the same. That is because about one-third of all places at state institutions are now reserved for tuition-paying students. New, private institutions provide additional places for students who can pay. At the country’s main institution of higher education, Moldova State University in the capital, 40 per cent of students now pay tuition. The fees range from about \$160 per year in the sciences to \$700 in economics, foreign languages, and law—subjects that are now in much greater demand in this country. The average monthly salary in Moldova is estimated at \$50. Students applying to the state-university system must choose to compete for a place in either the tuition-free section or the fee-paying one. The two sections have the same entrance examination, but the fee-paying section accepts applicants with considerably lower test scores. However, in most subjects, once admitted, paying and non-paying students study together and share the same classes. Officials of Moldova State say the dropout rate, about 20 per cent, is the same for paying and non-paying students.

The country appears to be making an effort to use wisely the tuition it collects. The funds remain at the institution where the paying students are enrolled. According to government regulations, the money must first be used to supplement faculty salaries, which average about \$80 per month but can reach about \$200 with the help of supplemental funds. Remaining funds go to insure that student stipends are paid on time, and also are invested in new facilities. Moldova has ‘very big economic problems,’ says **Petru Gaugas**, a former Minister of Education who is now vice-rector of Moldova State University. ‘But education now is more democratic, and we have autonomy. Our own Senate makes all decisions about admissions, curricula, and salary supplements. These decisions used to be made by the state.’ Moldova State now gets half of its budget from tuition payments and half from the state. ‘It’s a good solution in this difficult time,’ says Mr. Gaugas. But serious

concerns remain that many young people are being prevented from studying because 'parents don't have enough money,' he says. Student loans do not exist in Moldova, but the education ministry is preparing legislation to introduce such a system.

### Russia—USA

#### *Russian universities accused of helping Iran*

Sanctions imposed by the Americans against three top Russian technical universities, following claims that they were helping Iran build missiles and nuclear weapons, have provoked fears that years of international co-operation could be put at risk. Professors at Russia's top chemistry institute, Mendeleyev University in Moscow, say links with American colleges, including the Massachusetts Institute of Technology, Bowling Green State University and the University of California, Berkeley, could be severely damaged if US national security adviser **Sandy Berger's** threatened economic sanctions are imposed. Economic sanctions were announced after Mr Berger accused Mendeleyev, Moscow Aviation Institute and the Institute of Power Technology's scientific research and design arm, NIKIET, of providing Iran with sensitive missile or nuclear assistance. University rectors and professors at the institutions are puzzled over the reasons for the American move. The Iranian embassy in Moscow said Tehran claims that there were no official links with the named Russian universities. **Pavel Sarkisov**, rector of Mendeleyev University said: 'Mendeleyev has absolutely no contacts with Iranian organisations or private citizens.' He is worried that its annual US student exchange program, involving 60 students, could be threatened. 'We hope other countries will not follow America's example. I don't believe that because of one American fool all other people will act like fools as well,' he said. Allegations by US sources have cropped up in the past with relation to other countries in the Middle East such as Israel, affecting university relations.

### USA

#### *Project proposal to integrate new semantic tools for Web instruction software*

Although the WorldWideWeb now is accessible almost everywhere, on-line instruction is not catching on as rapidly. In a large part this is because courses must be assembled manually and cannot be adapted easily to individual student needs. Currently, less than 10 per cent of US colleges and universities offer on-line courses. To tap into a potentially vast market for distance learning, Real Education will develop the technologies needed to enable non-programmers to design courses rapidly and provide materials and interactive instruction

that are customised for each student. The company plans to integrate latent semantic analysis (LSA), an automated method of deriving meaning from text, with radial basis function (RBF), a neural network that enables software to improve its own performance through machine-learning algorithms. The key technical challenge will be to integrate these two techniques, which are proven but have yet to be combined, to create an intelligent tutoring system that processes documents rapidly and precisely in response to the needs of the learners. The proposed system will include a smart searching capability that is expected to improve retrieval of relevant documents for on-line courses (current Web search engines retrieve only 30 per cent of relevant documents plus many irrelevant ones). The system also will sort documents by topic into possible course paths, reducing the time required to organise courses. In addition, the proposed system will develop an internal model of each student to provide customised instruction and automatically tag courseware to keep track of it among the enormous volume of on-line educational material. Thomas K. Landauer Usability, Inc. (Boulder, Colo.), will help develop LSA knowledge representations for uses in prototype LSA/RBF systems. The ATP project will greatly accelerate the development of tools that will dramatically increase the availability of on-line courses, improve educational quality by adjusting courses to student needs, and reduce the cost of developing and modifying courses by as much as 60 per cent. Within a few years, the potential market for on-line courses could include 50 million K-12 students, 65 million college students, and 80 million corporate employees or other adults requiring continuing education. For project information contact: Jon Dobrin, tel. +1 (303) 873-7400; e-mail: jon@reaeducation.com

### New Zealand

#### *Universities versus polytechnics, New Zealand version*

**Bryan Gould** vice-chancellor of the University of Waikato has come out with criticism of the government's 'fair' proposals which he claims threaten New Zealand universities' international standing. Dr. Gould's arguments, presented below, are a reflection of the universal squabbles between higher education institutions when they are required to share the same pie of funding. In New Zealand a differentiated higher education sector between polytechnics and universities remains in place. This is in contrast to the United Kingdom and Australia but can be compared to the situation in Germany where Polytechnics remain polytechnics. Although, in Germany they are now officially called Universities of Applied Science. (How incompetent can one get in translating a name, whatever it means in the original

language—ed.) Polytechnics are entitled to offer similar degrees to universities. Polytechnic degrees do not, on the whole, enjoy the same esteem as university degrees. One reason for this is that the universities have a stronger and more comprehensive research record than the polytechnics. For the polytechnics to compete with the universities in research, even if they could afford to, would take them well wide of their original responsibilities to vocational education, which remains valuable and important, and would open them up to competition in vocational education from a burgeoning private sector. Yet, if they do not, they will lose out to the universities in the business of providing degrees.

One or two of the large metropolitan polytechnics are on the verge of becoming universities, already offering a wide range of degree courses and building a research profile. Their ambitions are resisted by the universities and by those who say there are too many universities already. It is inevitable that if meeting particular criteria is the path to university status, some polytechnics will eventually do so. At the other end of the scale are small and barely viable institutions set up to meet the needs of a locality or region but which are now struggling to survive.

A government White Paper now published has set the scene for a conflict between universities and polytechnics in the struggle to obtain research funding. The first restriction adversely affecting universities is a proposal called a 'variable tuition subsidy' which will mean a reduced subsidy for asset-rich institutions with the savings passed on to poorer institutions. Because universities are on the whole larger, longer established and more demanding of capital, this arrangement will lead to a substantial net transfer of resources to the polytechnics. If this proposal should ever see the light of day, the impact on the universities could be very substantial. In the second measure the government wants to install a mechanism for monitoring the research outcomes delivered in return for the resources provided to universities for their general research (as distinct from the project-based research which is separately funded through the ministry of research, science and technology). The white paper proposes withdrawing NZ\$100m (£32m) from the general tuition subsidy and placing NZ\$20m of that (rising over time to NZ\$80m) in a separate contestable fund. That fund would then be allocated on the basis of research achievements, perhaps using an adapted version of the UK grading system. While all tertiary institutions would be able to apply to the fund, universities would no doubt take the largest share. The balance of the NZ\$100 million would be allocated to all institutions awarding degrees, through top-ups provided for undergraduate, graduate and postgraduate degrees.

On closer examination, claims Dr. Gould, it is clear that the NZ\$100m will come exclusively from the money directed at present to postgraduate

degree programs—the virtually exclusive preserve of the universities. That money will then be recycled into both the contestable fund and into the top-up subsidies for degree programs. Because the polytechnics also offer degrees, they will benefit from the top-up. There will be, it is estimated, a net flow of about NZ\$7.5m from the universities to the polytechnics.

This haemorrhage is bad enough. The policy implications are even less acceptable. The rate of financial support for postgraduate research will be sharply reduced. New Zealand universities, already strapped for cash, will be hard-pressed to sustain, let alone expand, their research programs since every research degree will cost the university a large sum of money. It is hard to imagine a more certain recipe for destroying the New Zealand research effort. It is equally hard to imagine a government deliberately setting out to achieve such an outcome. One can only conclude that the government has not understood the implications of its proposal. These blows are delivered in the name of a search for fairness between different parts of the sector, which seems at first glance to be commendable. It makes sense only, however, if all institutions are trying to achieve the same purposes, with the same needs for the same resources. This is manifestly not the case. The universities and the polytechnics fulfil very different roles, making very different demands. Universities are, almost by definition, more expensive institutions. We could certainly fund universities and polytechnics at the same level but we should not then be surprised if equally funded institutions produce broadly equal outcomes. To reduce their funding even further will be to threaten their claim to be recognised internationally as worthy of the name of university.

The real explanation of the white paper according to Dr. Gould is that it has very little to do with fairness. The government's real concern is for the viability of the weaker polytechnics. Unwilling to find new money, they have exploited the ever-present tendency to regard the universities as a pampered elite, dressed it up in the guise of fairness, and found resources for the polytechnics at the expense of the universities. Thus is tertiary education policy made.

## Conferences

### **10<sup>th</sup> International Conference on College Teaching and Training**

14–17 April 1999

Jacksonville FL, USA.

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<http://www.fccj.cc.fl.us/conf/>

### **4<sup>th</sup> European Forum for Continuing Engineering Education**

9–11 June 1999

Trondheim, Norway.  
Contact: Mary Saeterbakk,  
SEVU Congress Department.  
Tel: +47 7359 5669; Fax: +47 7359 5150  
e-mail: mari.saterbakk@sevu.ntnu.no  
<http://www.ntnu.no/sevu/4thforum>

**American Society for Engineering Education  
Annual Conference**  
20–23 June 1999  
Charlotte NC, USA.  
Contact: Dyanne Hughes,  
1818 N. St. NW

Washington, DC 20036, USA.  
Tel: +1 202 331 3522  
e-mail: d.hughes@asee.org  
<http://asee.org>

**Meet '99**  
**Maritime Engineering Education and Training**  
21–24 June 1999  
St Petersburg, Russia  
Contact: Kirill Rozhdestvensky,  
St Petersburg State Marine University,  
3 Lotsmanskaya, St Petersburg, Russia.  
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