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AUSTRALASIAN ASSOCIATION FOR ENGINEERING EDUCATION

NEWSLETTER

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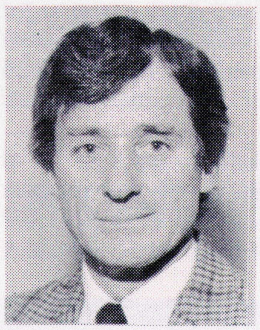
The First International Congress of Engineering Deans and Industry Leaders (ICEDIL) will be held at UNESCO Headquarters in Paris between 23 and 25 June 1993. This Congress is the result of two International Symposia for Deans and Industry Leaders which were organised in 1989 and 1991 by UNESCO in association with appropriate engineering education associations, including the AAEE. The picture above shows a view of Paris which will host participants of the ICEDIL.

This issue is sponsored by

The Institution of Engineers, Australia

FROM THE PRESIDENT



Prof. P. Darvall

I believe that members of our Association will become more familiar with the acronyms FEISEAP (Federation of Engineering Institutions of South East Asia and the Pacific) and AEESEAP (Association for Engineering Education in South East Asia and the Pacific) in the next few years, and involved in their activities.

FEISEAP member countries include the PRC, Japan, Thailand, Australia, Hong Kong, New Zealand, the Philippines, Malaysia, Fiji, PNG and Indonesia. FEISEAP has so far held Executive meetings roughly annually, with a lesser number of General Assembly Meetings. Though commitment from its members has been variable over the years, it is clear that FEISEAP has an important role to play in a shrinking world, as reflected in the titles of its Standing Committees: Professional Practice, Engineering Education, Exchange of Information and Engineers, Rural Electrification and Engineering and the Environment. The latter Committee has worked closely with the WFEO (World Federation of Engineering Organisations) Environment Committee.

With the enormous growth in our region and with the increasing internationalisation of engineering education FEISEAP and AEESEAP are *ideas whose time has come.* We are fortunate that the current President of FEISEAP is Mr Martin Thomas, a former President of The Institution of Engineers, Australia, and that the Secretary General is Mr Bill Rourke, former Chief Executive of the IEAust. In recognition of the growing influence of AAEE I was invited by them to chair the FEISEAP Workshop on Engineering Education in Cairns on May 6, supported by AIDAB (Australian International Development Assistance Bureau).

Most member countries made presentations at the Workshop on aspects of engineering education, from low to advanced levels. The members fall into two main groups: those where engineering institutions play a significant role in professional engineering education (as in accreditation of courses in Australia by the IEAust), and those where the education of the profession is a matter for government (as in the PRC). The scale of engineering education is widely variable, from about 650 professional engineers total and 70 graduates per year in PNG to more than 80,000 per year in Japan.

AEESEAP was established in 1973 with the support of UNESCO, with objectives to promote engineering education in the region, and to provide for the appropriate exchange of ideas and information. Thirteen countries are voting members of AEESEAP, largely overlapping the FEISEAP membership. The current President of AEESEAP is Professor David Elms of the School of Engineering at the University of Canterbury, and the 3rd Vice-President of our Association. The AEESEAP Journal, Vol.22, No.1, March 1992 contains thirteen country reports on engineering education in our region, which together with other selected papers make very interesting reading. Members of AAEE may be able to obtain copies from the current AEESEAP Secretariat c/- School of Engineering, University of Canterbury, Private Bag 4800, Christchurch, New Zealand; fax:64.3.364-2758. FEISEAP and AEESEAP are co-sponsoring a conference to be held in Singapore in November 1993, on *Future Trends and Challenges in Engineering Education.*

Another very interesting development in this context is the UMAP Project (University Mobility in Asia and the Pacific) promoted first by the AVCC (Australian Vice Chancellors Committee) and later by ASAIHL (the Association of Southeast Asian Institutes of Higher Learning) and Korea and Japan as well. To quote from a paper presented to the FEISEAP Workshop by Professor Robert Smith, President of the AVCC: *The general objective of UMAP is to achieve, by extended and enhanced co-operation between higher education institutions, a better understanding within the countries and territories of the Asia/Pacific region of the cultural, economic and social systems of the region, and to do this by increasing the mobility of higher education in the region;* and *Australian universities see UMAP then as a new and further means of facilitating the exposure of Australian students*

to the systems of other countries and, through the reciprocity arrangements which are part of the program, of enabling similar numbers of 'students to be enrolled in Australian institutions.

The first round of exchange programs under UMAP helped to support 102 Australian undergraduates, including a small number of engineering students, to study in 5 Thai and 27 Japanese universities. These developments are welcome examples of internationalisation, which will become increasingly important in the lives of AAEE members, and of our students.

Professor Peter LeP Darvall
Dean of Engineering
Monash University
President of AAEE

ADVANCED SATELLITE-BASED ENGINEERING EDUCATION: THE NATIONAL TECHNOLOGICAL UNIVERSITY

Live video and videotaped lectures have been a part of higher education since the early 1960s. Videobased education has been primarily used in outreach efforts where colleges and universities serve local, but remote, constituencies such as governmental organisations and businesses. Many of the courses these universities offered were technical in content, that is, business and governmental organisations tapped into the regional university for continuing education to support technical professionals and their managers.

In 1984, the National Technological University (NTU) located in Fort Collins, Colorado, USA was founded and incorporated as a non-profit institution. It was founded for the sole purpose of serving the advanced educational needs of highly technical engineers, scientists, and technical managers. In 1985 NTU began broadcasting for-credit, graduate engineering courses via satellite from 19 member universities located all across the United States to more than 200 equally distributed governmental and corporate receiving sites. Students at these sites arrange to view the course live or from videotape at their convenience. Each student, with the consent of their advisor, executes a plan of study leading to the Master of Science Degree in Engineering. Additionally, NTU delivers highly technical state-of-the-art *just in time* non-credit, short courses to participants in the same governmental and corporate receiving sites.

NTU is unique in many different ways and is truly a non-traditional university with a very important and special niche in the spectrum of higher education. Following is a partial list of the most significant factors that distinguish NTU from other institutions of higher education:–

* Equal attention is given to both the advanced degree and the continuing education needs of its users.

* NTU consists of a partnership of universities that provide the graduate courses from their respective campuses via satellite-delivered, instructional television. This represents a wide base from which to draw the best of talent and courses. As a fully accredited university, it integrates the courses into the individual disciplines and awards the degrees. The other courses, symposia, and teleconferences delivered and managed by NTU come from diverse sources including universities, industry and other providers.

* Carefully selected faculty consultants oversee the selection of for-credit courses and academic degree programs.

* As a university, NTU's mission concentrates on education, with its research efforts focused on educational technology and telecommunications in education.

* NTU's programs are driven primarily by the technical educational needs and requirements of its customers.

* Because the students are all working professionals and managers sponsored by their organisations, they are very selective and demand offerings of the highest quality, substance, and pragmatic value.

* NTU manages and operates a very sophisticated satellite network infrastructure between industry, government and the university community.

* Distance learning technologies centered around satellite transmission are used to deliver the course offerings and link the geographically dispersed students with the dispersed sources. Many courses are delivered in real time with interaction between the students and the instructors.

* Because of its structure, NTU is not inhibited or constrained by undue administrative procedures when bringing together meaningful programs on a timely basis.

* NTU's lack of high investment in fixed assets required by traditional universities (eg dormitories, libraries, athletic facilities, etc) gives NTU an exceptional level of operational flexibility.

During the academic year 1991/1992, NTU offered over 500 for-credit courses. There were 4,500 course enrolments in these courses. The total broadcasting time for these classes totaled 24,765 hours during the year. One hundred twenty-five Master of Science Degrees were awarded in seven disciplines: computer engineering, computer science, electrical engineering, engineering management, manufacturing systems engineering, management of technology, and materials sciences and engineering.

Through January, 1993, 326 students have received the MS degree from NTU. There are now over 1,550 students enrolled in the MS degree program. If the present growth rate continues, NTU will be awarding nearly 700 MS degrees annually by 2000. Four additional disciplines have been recently added: health physics, hazardous waste management, software engineering, and a special majors program. Within the special majors program it is possible for a student to pursue studies in mechanical engineering, optical sciences, telecommunications, aerospace, etc. Today, forty-five of the leading engineering universities are now broadcasting video courses to nearly 480 sites in the USA, Canada, and Mexico.

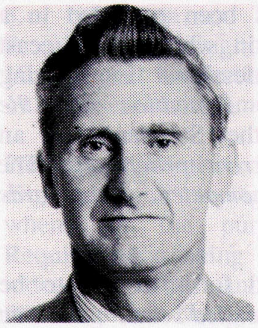
Until November 1991, the National Technological University broadcast four analog video channels using two satellite transponders. Beginning in November 1991, the analog broadcasts were replaced with compressed digital video (CDV) technology. Currently, nine compressed digital video channels are carried on one transponder, and up to five additional, or fourteen total, digital channels can be accommodated on the single GSTAR I transponder as NTU implements all the features of the new CDV system. Of the nine channels currently in use, six are used to transmit for-credit MS degree courses; two are used to transmit not-for-credit short courses; and the remaining channel is used as a remote controller for activating/deactivating the video decompression facilities, turning on and off local videocassette recorders (VCRs), or sending fax transmissions. NTU's new digital transmission system revolutionises distance learning. It drives down the cost of the space (satellite) segment by a factor of seven, making the tremendous benefits of satellite transmitted education more widely available without sacrifice in quality.

Once television is in digital format it can be manipulated just like any other digital media, e.g., text, graphic images, sound, etc. Digital television may also be conveyed on a high-speed local area network. In a joint research project between Colorado State University and the National Technological University compressed digital television is received from the satellite down-link, passed on to a 100 million bit per second fibre-distributed data interface (FDDI) network, and delivered directly to the workstation on the engineer's desk for display in a local windowing environment. The compressed digital video signal is decompressed in

the workstation producing full colour, full motion video. The bandwidth required for carrying the compressed digital video signal is three million bits per second, well within the capability of the FDDI computer network. Of course, other information in digital format can be transmitted as well, making simulations, graphic images, sound, documents, etc. deliverable to the workstation. With this technology in place, it becomes possible to consider on-demand delivery of instructional materials to the engineer at his or her workplace. This project supports the movement away from classroom training as a primary medium for education, toward a process of knowledge acquisition and application that enables technical professionals to acquire the knowledge they need, at the time, location, and in the format most conducive to their learning.

Gearold R. Johnson, PhD
Professor and European Study Director
National Technological University
Fort Collins, Colorado, USA

SOME THOUGHTS ON THE ENGINEERING COMPETENCY STANDARDS



Prof. R.K. Duggins

Introduction

This contribution to the Newsletter has been written in response to an invitation from the Editor. My intention is to make some personal observations on (a) the article in the March issue by Brian Lloyd, Deputy President of IEAust and (b) the Engineering Competency Standards themselves.

Readers of Lloyd's article, including myself, will have been in agreement with much of what was written. The use of competency standards in the workforce should indeed assist in evaluating migrants and in recognising and maintaining levels of professional and technical competence. With respect to engineering in particular, the recently compiled National Competency Standards for Professional Engineers (NCS) will be used in new criteria for corporate membership of the Institution.

There is also an unintended benefit which might flow from the NCS and from the fact that they are to remain the property of the Institution for its own use. It is that they should enable any threat to the authority of the Institution to be resisted more readily.

One such threat has already arisen, namely the creation of a new *Engineering Body* recommended by the VEETAC advisory committee to the Commonwealth and State Ministers of Vocational Education, Employment and Training. The objectives and functions of the Body would include the promotion and monitoring of the development of national competency standards and assessment procedures for the engineering workforce. The proposed membership of the Body is also a cause for concern in that eleven members are envisaged only one of whom would be nominated by IEAust.

It is surprising that such a recommendation should have been made at this late hour bearing in mind that (a) it was some months earlier that IEAust entered into the Agreement with the Commonwealth Government to develop the Competency Standards for the profession and (b) such a body would duplicate the functions already performed by the Institution. It is reassuring that the compilation of the NCS has already been completed.

Turning to competencies in relation to the characteristics of graduates, this is a matter which was considered in the recent National Enquiry to examine quality in higher education (The Chubb Report) even though the Government has repeatedly said that it has no policy requiring the incorporation of competency standards in higher education. A concern expressed in the Report was that the competency debate, if not handled in a measured way, could both distort the key purposes of higher education and distort the current higher

education agenda.

The Report also reflected that the pressure on universities to adopt a competency-based approach stems from two sources, partly from NBEET's Employment and Skills Formation Council but mainly from the professions. It also expressed concern that professional bodies may attempt to depart from well-established practices and seek to develop competency lists which are too narrow and prescriptive to serve the generic educational objectives of university curricula. Any such attempt would have to be strenuously resisted by the universities which must continue to shoulder full responsibility for all curricula including those which underlie professional education.

These words of caution will clearly need to be borne in mind by engineering educators when our undergraduate courses are periodically accredited by IEAust. Courses will continue to be accredited as in the past except that the NCS will henceforth be incorporated into the accreditation principles albeit in a non-prescriptive way. Lloyd provides reassurance in his article that the Standards *do not impose anything upon the undergraduate education process or curricula.* He also described *the generic proficiencies required for entry to the profession (coming) from the criteria for accreditation.*

Further information on the use of the NCS for course accreditation has been provided in a paper by Ted Whitehead, IEAust's Director of Education and Training, in which he forecast the impact of the NCS on the existing Basic Requirements for a Professional Engineering Course. The paper was presented at the 1992 conference on *Higher Education and the Competency Movement* and inter alia described the development of the Standards as an opportunity for the Institution *to review, improve and better define current practices.* The Basic Requirements document would be made *more explicit using competency standards terminology of generic competency units and performance criteria.*

There are seven elements in Basic Requirements which must be satisfied for a course to be accredited and one of them is *engineering synthesis or design and related communication skills.* It was this that Whitehead chose to use in order to illustrate the expected impact of the Competency Standards in general and Competency Elements and Performance Criteria in particular. Further discussion of this will be given shortly.

Digressing for a moment from the question of competencies, but still on the subject of Basic Requirements, Lloyd's article has unintentionally thrown further light on the increased volume of management studies which institutions are required to incorporate in their professional engineering undergraduate courses, ie in the vicinity of 10% by 1995. Although the Australian Council of Engineering Deans (ACED) is critical of this new and controversial policy and has formally requested IEAust to withdraw it, it nevertheless remains in force.

ACED's concerns are now likely to be heightened by the further information revealed in the article on those segments of course material which institutions are not to be allowed to include in the 10%. (It is detailed in the table of inter-relationships between the existing Basic Requirements and the eleven new units of competency in the Standards.) IEAust appears to have changed its position in some respects and now sees, for example, *communication skills* (ie part of Basic Requirement 3*) as being in addition to the 10% and not part of it. In its *Guidelines for Management Studies in Engineering Undergraduate Courses* published in January 1991, the Institution had proposed that *Communication for Engineers* be a key component of the Management Studies syllabus but the table makes it clear that the 10% must come wholly from the core management material specified in Basic Requirements 5* and 6*.

Note: * Altogether there are seven elements in Basic Requirements and the three which are referred to above are as follows:-

3. engineering synthesis or design and related communication skills;
5. the basic principles underlying the management of the physical,

	human and financial resources associated with the practice of engineering; and	) To be *in the vicinity*) *of 10%* of the total.
6.	professional responsibility, social effects and ethical aspects of engineering practice.	))

A Summary of the NCS Content

Clearly the IEAust Standards, which comprise a 70-page document, are of considerable importance and it behoves members of the profession to acquaint themselves with the content; here it must suffice merely to convey the flavour. Of particular importance are the units of competency which have been identified. They are:-

1. Professional Engineering Ethics and Principles.
2. Professional Engineering Practice Skills.
3. Professional Engineering Planning and Design.
4. Management.
5. Communication.
6. Research, Development and Commercialisation.
7. Materials or Components.
8. Education and Training.
9. Manufacturing or Production.
10. Project Implementation.
11. Asset Management.

Particular attention is drawn to the third listed unit of competency, namely *Professional Engineering Planning and Design*. This is the one which was foreshadowed by Whitehead when, for the purposes of illustration, he referred to the *design* element of Basic Requirements being made more explicit in the Standards. The increased explicitness has indeed occurred and, for the graduate professional engineer, the Professional Engineering Planning and Design unit has been divided into the following components:-

1. Clarify and define engineering design requirements.
2. Prepare concept proposal to meet requirements.
3. Perform or arrange for design of selected proposals.
4. Perform design evaluation.
5. Prepare supporting documentation; and
6. Maintain integrity of design identification documentation.

Each of the six components is then divided into up to six sub-components and the full description amounts to about 600 words contrasting dramatically with the corresponding eight-word description in Basic Requirements.

The NCS also specify range statements for each of the eleven units of competency and they are expanded in two Appendices. Appendix A, comprising seven pages, gives the range statements for twenty-five engineering disciplines, eg Mechanical Engineering. Appendix B, comprising nine pages, gives the range statements for ten enabling competencies eg Fluids and Thermodynamics, and contains considerable syllabus detail. The latter is discussed further in the next section.

Some Thoughts on the Content of the Engineering Standards

Turning now to some of the reaction that has been voiced to the content of the NCS, a good starting point is a recent meeting of Heads of Departments and Professors of Mechanical Engineering. Following its deliberations, the meeting recommended to the Institution that Appendices A and B be deleted *believing that they are over-prescriptive and detract from the usefulness of the Standards*. This reflected the meeting's difficulty in reconciling the syllabus detail with the Institution's reassurances that *the NCS are not about content and curricula* and that their use *will not be prescriptive*.

WORLD CONFERENCE ON ENGINEERING EDUCATION

15-20 October 1995
Minneapolis–Saint Paul, Minnesota, USA

THE CONFERENCE

This major World Conference on Engineering Education, the fourth in a series, is held every three years and follows the World Conference on Engineering Education, held in Portsmouth, England in September 1992 and the previous conferences held in Sydney, Australia (February 1989) and Cologne, Germany (April 1984). It is organised by the Technology Based Engineering Education Consortium, which is an organisation within the William C. Norris Institute. The University of Minnesota will be the local university host.

The Conference is organised on behalf of the **International Liaison Group on Engineering Education (ILG-EE)** and supported by the State of Minnesota, the General Electric Foundation and numerous professional and industrial organisations.

CONFERENCE THEME

The main theme of the Conference will be *Restructuring Engineering Education for Meeting World Needs.* Within this theme, the following important issues will be addressed:

- Productivity, Quality and Accessibility of Engineering Education
  - Maintaining Excellence at Lower Cost
  - Applying Technology to Expand Educational Access (to the student, to the workplace)
- Addressing Energy and Environmental Issues
  - Designing and Manufacturing Products – raw material to salvage
  - Educating Engineers to Effectively Manage Energy Use
  - The Role of Engineering in Energy Utilisation Alternatives and Practices
- Management and Utilisation of Technology
  - Preparing Engineers to be Management and Decision Makers in Technological Innovation
- Engineers in a Multicultural Society
  - Educating Engineers for Social Responsibility
  - The Ultimate Manufacturing Engineer
- Learning and Curriculum
  - International Differences in Engineering Education
  - Interdisciplinary Issues
  - Applying Appropriate Technologies in Engineering Education
- International Collaboration in Engineering and Technology
  - Government–Industry–University Programs and Projects
  - International Technology Sharing
  - International Accreditation and Cooperation
  - Exchange Students/Faculty Staff

For further information on the Conference please contact the Conference Chairman:

E.R. Krueger, PhD
Executive Director
Technology Based Engineering Education Consortium
William C. Norris Institute
Suite 815
245 East Sixth Street
St Paul, Minnesota 55101, USA
Telephone: (612) 225-1433
Fax: (612) 225-1241
E-mail: wcnrex@epx.cis.umn.edu

Train-the-Trainer for Practising Engineers and Technologists

A series of highly-specialised new train-the-trainer courses for engineering and technology staff in industry, academia, TAFE and defence forces who train others, either in class or on-the-job.

An innovative Master of Engineering Education has been developed in the Department of Electrical Engineering at The University of Sydney, Australia.

As a result of this comprehensive programme, short **Train-the-Trainer** courses are now available to practising engineers and technologists who wish to expand their career prospects and up-grade their training and communication skills. The full Train-the-Trainer programme comprises three self-contained four-day courses which can be taken individually or in a series: **Fundamental**, **Intermediate** and **Advanced**. Participants will develop the skills to:–

- Understand the teaching and learning processes.
- Develop and teach training programmes.
- Identify training needs and develop training courses related to these needs.
- Analyse tasks and develop efficient training instructions.
- Understand the processes in determining the tasks/duties of an occupation and the related knowledge/skills/attitudes.
- Learn and be able to apply modern concepts of educational psychology.
- Understand how to implement contemporary educational technology and computers in industrial training.

The Train-the-Trainer teaching team is drawn from highly-qualified and experienced academics, practising professional engineers, educationalists and trainers with a wide range of expertise in engineering, education, management and training.

This varied background gives the courses a unique relevance and flexibility. Participants may choose to do the courses at three levels. It is anticipated that credits from these courses may count towards the Master of Engineering Education when introduced. The three Train-the-Trainer courses meet the requirements of the Training Guarantee (Administration) Act. These courses have been approved by a Registered Industry Training Agent (RITA) and have attracted a $60 per day DEET subsidy under the Train-the-Trainer Assistance Program (TTAP) for eligible participants.

The couses will be held at The University of Sydney, Australia. Course dates:–

- **Fundamental 20 – 23 July 1993 and 31 August – 3 September 1993**
- **Intermediate 26 – 29 October 1993**
- **Advanced 23 – 26 November 1993**

The cost of each course is $985 (subtract the DEET subsidy, if applicable). For further information and enrolment forms please contact the Course Administration Office:–

Tel: (02) 692 2951 or (02) 692 2000
Fax: (02) 660 4706

Another concern with the specified syllabuses and course structures is that they probably differ from what many engineering educators would consider appropriate. For the subject of fluid mechanics, for example, Appendix B defines syllabus material up to the engineering technologist level but is silent with regard to additional fluid mechanics for Bachelor of Engineering candidates. In my own institution, fluid mechanics is considered to be a compulsory core subject and is taught in each post-introductory year of the BE degree course.

The meeting also noted the refinements that had occurred during the iterative development of the Standards. The tone of the Standards appeared to become progressively more benign and expressions such as *mandatory in all cases* and *full compliance* which had been present in the earlier versions are absent from the final one. The earlier versions had also described the features which distinguish professional engineers from engineering technologists and specified possible articulation paths from one to the other. The meeting was concerned in particular with the proposed Articulation Path 2 which would have allowed engineering technologists to articulate to the professional engineer category solely by experiential development and without the need for any academic topping up. It urged IEAust to reject the proposal, and the latter has indeed been omitted from the final version of the Standards.

Concluding Remarks

The Institution is to be commended for having brought the National Competency Standards for Professional Engineers into being. They should prove to be a useful aid in the evaluation of overseas engineering skills, in recognising levels of competence in the Australian workforce, and in reinforcing its own authority.

Also welcome are the reassurances provided by the Institution that the Standards impose nothing on the undergraduate educational process or curricula. However, engineering educators will feel more comfortable if subject syllabuses are deleted from the Standards and if the Institution refrains from using the Standards for the accreditation of undergraduate courses.

Professor Robert K. Duggins
Department of Aerospace and Mechanical Engineering
University College (UNSW)
Australian Defence Force Academy

A CALL FOR RENEWAL OF MEMBERSHIP

At the 4th Annual General Meeting the Executive Committee did not seek to increase membership fees, and it was decided that membership fees for 1993 remain the same as they were in 1992. Association members are kindly asked to renew their membership, and to encourage their colleagues who are not members of the AAEE to join our Association. Although fees are payable by June 30 each year, we would appreciate it if members would pay their dues as soon as possible so that we may more effectively plan the 1993 budget. AAEE members who are corporate members of the IEAust are encouraged to renew their AAEE 1993 membership through the IEAust, using the IEAust's 1993 Subscription Form.

A call for renewal of membership is therefore made and a single-page reminder is included in this issue for those who are not members of the IEAust.

INTERNATIONAL CONGRESS OF ENGINEERING DEANS AND INDUSTRY LEADERS

In April 1993 several members of the AAEE received the Second Announcement of the International Congress of Engineering Deans and Industry Leaders which will be held at UNESCO Headquarters in Paris between 23 and 25 June, 1993. The Congress is organised

jointly by UNESCO and the International Union of Technical Associations and Organisations (UATI) with other national and international organisations represented on the Congress Steering Committee. This Congress is a follow-up of two International Symposia for Engineering Deans and Industry Leaders. The first symposium was organised in 1989 at Ohio State University, and the second was held at UNESCO Headquarters in Paris, France, between July 16 and 20, 1991.

The Congress Program envisages paper presentations and panel discussions on a number of issues and topics relevant to engineering education. The themes of the six panels, as stated originally in the program, are as follows:

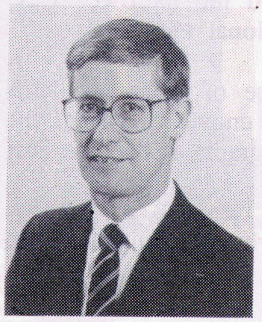
Panel I	Development of mechanisms of university - research institutions - industry cooperation: research and development networking.
Panel II	Development of mechanisms of university-industry cooperation for education and training.
Panel III	Preparation of engineers for effective contribution to the needs of national economies.
Panel IV	International cooperation: the new dimension.
Panel V	Quality engineering training in developing countries.
Panel VI	Transfer of technology: experiences, success, failures and prospects.

Each panel will consist of a panel board. The board will include six members; two co-chairmen, one reporter and three members. The role of the board members would be to prepare a report on key issues addressed during the panel sessions. Final conclusions and recommendations on projects or actions included in the report will be presented at a plenary session. It is envisaged that the Congress would lead to the promotion of one or two projects on international co-operation between universities, research, education and training institutions, and industry.

We should note with satisfaction that two deans of engineering faculties in Australia expressed their desire to attend the Congress. So progress has been made as no Australian deans had attended the 2nd Symposium for Engineering Deans and Industry Leaders held at UNESCO Headquarters in 1991.

Further information about the Congress may be obtained from the Congress Office: UATI, Maison de l'UNESCO, 1 rue Miollis, F - 75732 Paris Cedex 15, France, Tel: +33 1 45682747, Fax: +33 1 43062927.

ENGINEERS AND COMPETENCY STANDARDS



Prof. T.W. Cole

The Institution of Engineers has just published its National Competency Standards for Professional Engineers (Stages 1 and 2), a document which has been long in the coming and which has created considerable heat over the last few years. Is this yet another tightening of control over the freedom of universities? Can they no longer produce a diversity of graduate which all agree are needed to create wealth in Australia? Well, maybe not. But, nevertheless, the report is good reason to reflect long and hard on what we mean by an engineer and what role university engineering faculties should play.

Whereas the Standards were initiated by a concern to assess overseas qualified engineers for accreditation within Australia, the Standards do have a strong relationship to the developmental needs of Australian graduating engineers. How is this? Well, I believe very few university staff would deny a distinction between the types of problem-solving, laboratory practice, design, and examinations at the undergraduate level and the environment, decision-making, responsibilities, liabilities and pressures of a true professional.

Somehow there is a transition from the somewhat sheltered and artificial world of the undergraduate engineering program and that of the commercial and legal reality of the workplace. Otherwise, why is it that perhaps most other countries require state registration of engineers before they can claim to practice as professionals?

In the UK, the major study by Finniston in 1980 recognised this need for engineer formation following on from the undergraduate preparation. In many UK universities, this formation is now partially formalised in Masters and other programs.

In 1907 one can find a Charles Mann from Chicago University reporting an investigation that showed the major engineering employers assessing the efficiency of its employed graduates *in terms of initiative, tact, honesty, accuracy, industry, personality and other qualities of this kind.* Then, just as now, these are rarely attributes concentrated on at the undergraduate level.

Yet it is exactly these broader personal qualities which need (in most cases!) to be added to the technical knowledge, skills and understanding of an undergraduate degree before one has the makings of a good professional engineer.

Apart from perhaps a career in selected areas of research, the professional is one who increasingly manages people rather than material and for whom the dollar sign becomes the most important symbol in the equations solved as part of the daily work.

To that end, any National Standards which could reinforce while also easing this transition and which gave recognition to appropriate combinations of achievement of both the formal (first degree) aspects of engineering and the practice aspects of professionalism can only be welcomed and applauded.

Established standards and performance to those standards can only raise the reputation and performance of the profession. It can protect the engineer against unwarranted assertions of incompetence. It can only heighten the respect given by the community to the engineering profession.

So what was all the fuss about? Perhaps it was because the competency standards were also applicable to alternative career paths. This articulation process is aimed at providing advancement opportunities for those with other than the four year university degree. Quite rightly a number of university academics could not see many of these alternative paths providing quite the same fundamentals of mathematics, science, engineering science and analysis of at least the better undergraduate programs.

The problem is one of definition of what one means by an engineer and the narrower view of the university educator when compared with an employer of a professional engineer.

As engineering educators perhaps the pressure imposed by the appearance of these standards is to better understand the diverse and relative roles of the professional engineers within the workplace. One then appreciates that the more formal undergraduate programs really are just one aspect of the maturing process.

Surely an engineer is assessed and selected for a job on the basis of what the engineer can do.

Surely this has more to do with proficiency than with competency!

Professor Trevor W. Cole
Department of Electrical Engineering
The University of Sydney

2ND EAST-WEST CONGRESS ON ENGINEERING EDUCATION

Preparations for the 2nd East-West Congress on Engineering Education under the theme *Enhancing Engineering Education Research*, which will be held at the Technical University of Lodz, Lodz, Poland between 20 and 24 September, 1993, are in full swing. This is the second in the sequence of East-West Congresses on Engineering Education. It is an important occasion for the Electrical Engineering Education Research Group (EEERG) and the Australasian Association for Engineering Education (AAEE), which have joined forces to foster the involvement of Australians in Central and Eastern Europe. The main objective of this effort is to assist education institutions in Central and Eastern Europe in restructuring their university engineering courses.

Members of our Association who have expressed their interest in the Congress have already received a copy of the Preliminary Congress Program, including an invitation to take part in this important international gathering staged by Australians in the heart of Europe.

The Congress Preliminary Program includes comprehensive information on the academic content of the Congress and the associated social and accompanying person program. Over 100 papers and special addresses will be presented at the Congress. The Opening Ceremony will be attended by the Australian Ambassador to the Republic of Poland, His Excellency Anthony C. Kevin, three senior ministers of the Polish Government and representatives of other organisations, including UNESCO.

This Congress coincides with the opening of a new undergraduate degree program in electromechanical engineering at the Technical University of Lodz, with English as the main medium of instruction. The long-term objective of this new enterprise is to train professional engineers in areas most relevant to the needs of the region, with particular emphasis on a sound preparation for more international involvement. The idea of teaching students in the English language has stimulated the establishment of a collaborative program between the Technical University of Lodz and several academics representing a number of education institutions in Australia.

A typical downtown street in Lodz.

The Australian nature of this project is through the establishment of the International Faculty of Engineering and the assistance in the development of this first degree program. The project enjoys the patronage and support of the Australian Ambassador to the Republic of Poland, His Excellency Anthony C. Kevin, who has accepted our invitation to be the Guest of Honour of this important international gathering of engineers and academics.

Also, the International Liaison Group on Engineering Education (ILGEE) has strongly supported and promoted this Congress on the international arena, thereby strengthening international links and collaboration on engineering education. Several academics from the United Kingdom have responded to our call to become involved in this Congress. They will form the second largest national group, under the leadership of the Chairman of the ILG-EE, Professor Terance V. Duggan of the University of Portmouth, and have contributed heavily to the Congress by submitting excellent papers.

The aim of this Congress is to prolong interest in engineering education among academics and industry leaders worldwide. Also, the important objective of this Congress is to promote and continue the international co-operation between developed and developing countries, and Central and Eastern Europe, which was so well initiated at the first East-West Congress on Engineering Education, held at Jagiellonian University of Cracow, Poland in 1991.

The Congress will present and discuss research and developmental activities on engineering education carried out throughout the world. Particular emphasis is being placed on the chosen theme *Enhancing Engineering Education Research* to stress the importance and relevance of quality research in engineering education on the training of engineering personnel for the 21th century. The Congress program has been structured to incorporate a number of plenary sessions, paper sessions with over 90 papers to be presented, and panel discussions. Several distinguished persons, who represent academia, professional associations, industry and government, will present keynote addresses and lead useful discussions. Also, the Congress will host the 6th Meeting of the International Liaison Group on Engineering Education.

The Congress will create the opportunity for some relaxation and enjoyment for participants, accompanying persons and Congress guests. Lodz, as the heartland of Polish industry, frequently called the *Manchester* of Poland, will provide the visitor with an unforgetable insight into the earlier era of industrial development but also with a variety of historical places of interest such as temples of different denominations, bourgeois residences and public buildings of particular architectural significance, as well as many other tourist attractions in the area surrounding Lodz.

May I remind you that a special one-day seminar entitled *Improving Training Methodologies* will be held at Jagiellonian University of Cracow, Poland, on Monday, September 27, 1993. The objective of this meeting is to discuss the outcomes of the *1st East-West Congress on Engineering Education* held at this ancient University in 1991. Those who may wish to contribute to the seminar by presenting a paper should contact the Seminar Organiser, Prof. Tadeusz Marek, Department of Industrial Psychology and Ergonomics, Jagiellonian University, ul. Golebia 13, 37-007 Cracow, Poland, Tel/Fax: +48 12 221538.

An official ceremony in conjunction with the opening of the undergraduate degree program in electromechanical engineering at the International Faculty of Engineering within the Technical University of Lodz is scheduled for Wednesday, 29 September 1993 in the newly acquired Faculty Building at 10.00. It is anticipated that the Australian Ambassador to Poland, His Excellency Anthony C. Kevin, will officially open the degree program. An academic procession will proceed this ceremony. International guests will be entertained by the university officials at a special lunch, and a visit to university teaching and research facilities will conclude the official program.

As Congress General Chairman, I cordially invite you to attend this international gathering and wish you not only to have successful formal activities but also a pleasant and interesting stay in Poland.

Further information and a copy of the Congress Preliminary Program may be obtained from Dr Zenon Pudlowski, the AAEE Newsletter Editor.

A UNESCO INTERNATIONAL CENTRE FOR ENGINEERING EDUCATION IN AUSTRALIA?

At its March meeting, the AAEE Executive Committee discussed the possibility of preparing a submission for the establishment of a UNESCO International Centre for Engineering Education in Australia (ICEE). The call for expression of interest published in the AAEE Newsletter (Vol.5, No.1) has attracted several enquiries from the most dynamic deans of faculties of engineering in key education institutions in Australia. Discussions have been carried out with a number of interested parties concerning important issues relating to the

establishment of the Centre in Australia.

The general brief for the Centre would be to provide expertise in and improve the quality of engineering education. In particular, it would be to carry out research on the equipment, courseware and software utilised in engineering education. The Centre's paramount objective would be to ensure an effective transfer of information on engineering education between developed and developing countries, essential for the development and advancement of the underdeveloped world so vital to the world's peace and stability.

It is envisaged that the ICEE would provide the necessary resources for a wide range of activities including research into the effective use of equipment, courseware and software, as well as the effective methodology utilised in engineering education. The key objectives of the Centre would be to:

* Collect information on research and development of equipment, courseware and software utilised in engineering education.
* Assess and evaluate established facilities already used in engineering education.
* Assess the effectiveness of teaching programs already in place and programs designed for developing technologies.
* Review and recommend textbooks for engineering education.
* Improve the quality of engineering undergraduate training by research into the methodology of the teaching and learning processes in engineering education.
* Develop modern techniques for the dissemination of engineering knowledge and skills.
* Develop models and methodology for the design and application of educational material and teaching methods which employ modern technology (video tapes, CDs, computers, etc).
* Promulgate information on recent research and development of teaching equipment, courseware and software.
* Stimulate, initiate and co-ordinate research into the effective use of equipment, courseware and software in engineering training.
* Promote collaboration in the field of engineering education between institutions in developed and developing countries.
* Provide short courses and seminars on engineering education for academic staff, industry, industrial management and community leaders.
* Research and develop new ways of information dissemination and course delivery such as multimedia and distance education.
* Lobby the world's engineering community, engineering associations, industry organisations and governments for support and understanding of new trends and of the need for the advancement of engineering education.

Several Deans of Engineering have responded to our call for expressions of interest concerning the establishment of the UNESCO Centre. Monash University's Faculty of Engineering has proposed that the Centre be housed at Monash University and so has the Faculty of Engineering at the University of Technology, Sydney.

A decision has been made to establish a UNESCO International Centre for Engineering Education within the Faculty of Engineering at Monash University under the chairmanship of the Dean of Engineering and the AAEE President, Professor Peter LeP Darvall. It is envisaged that at a later stage the Centre may form an international consortium in conjunction with the International Liaison Group on Engineering Education (ILG-EE) and the AAEE. This move may also involve a number of academic institutions worldwide.

No wonder that several enquiries were made by deans of engineering at Victorian academic institutions. Despite recent economic hurdles, Victoria is still regarded as the most educated and industrialised state, where progress, venture and vision are the key issues of concern for engineering leaders. The University of Melbourne and Royal Melbourne Institute of Technology appear to be potential partners in the establishment of the Centre at Monash University.

An official submission for the establishment of the UNESCO International Centre for Engineering Education has been recently prepared. At this stage the application is supported by several key institutions and individual persons. Letters of support have been received from the Federation of Engineering Institutions of South East Asia and the Pacific; The Institution of Engineers, Australia; the International Liaison Group on Engineering Education; the Association for Engineering Education in South East Asia and the Pacific, and others.

It is anticipated that this document will be tabled, presented and discussed at a second meeting of the UNESCO Steering Committee on Human Resources for Technical Industry Stimulation, the originator of this timely initiative, by Dr Zenon J. Pudlowski, supported by Professor Peter LeP Darvall this month in Paris.

Picture above shows the main building at Monash University in Melbourne. Monash University was the host of the extremely successful 2nd AAEE Annual Convention and Conference in December 1990. It is likely that this famous Australian University will establish a UNESCO International Centre for Engineering Education, becoming the first UNESCO Centre ever established on Australian soil.

For details of the Association and membership applications write to the Editor:

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Association members and tertiary institutions are invited to contribute to the Newsletter on matters relating to membership and engineering education.

Send contributions to the Editor at the above address.