

AUSTRALASIAN ASSOCIATION FOR ENGINEERING EDUCATION

NEWSLETTER

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The Fifth Annual Convention and Conference of AAEE will be held in Auckland, New Zealand. The University of Auckland will host the Convention and Conference, between 12 and 15 December, 1993. This University is the largest academic institution in New Zealand with over 20,000 students and is located in the largest city in New Zealand, commonly-known as the City of Sails. Members of the Executive Committee of the AAEE, Conference Chairman Professor Roy M. Sharp, and Members of the Conference Organising Committee cordially invite you to submit proposals for papers and to attend the Conference. Picture above shows a bird's-eye view of Auckland, New Zealand.

AUSTRALIAN ASSOCIATION FOR ENGINEERING EDUCATION

5TH ANNUAL CONVENTION AND CONFERENCE

AIMING FOR QUALITY

IN

ENGINEERING EDUCATION

AN INVITATION TO SUBMIT A PAPER AND TO ATTEND

Venue: The University of Auckland, New Zealand

Dates: Sunday 12 to Wednesday 15 December 1993

Conference Chairman: Professor Roy M. Sharp

The Fifth Annual Convention and Conference of the Australasian Association for Engineering Education will be held in Auckland, New Zealand from 12th to 15th December 1993. This is the first time the Conference will be held in New Zealand and is a practical result of the Association being *Australasian*.

Auckland is the largest city in New Zealand and is the most northerly of the main centres. The North Island is so narrow in the vicinity of the city that Auckland lies on two harbours, one on the Tasman Sea and the other, the beautiful Waitemata, on the Pacific Ocean. With a strong sailing tradition it is no wonder that the locals describe Auckland as the *City of Sails*. Nearly a quarter of New Zealand's population of 3.4 million live in the Greater Auckland area.

The University of Auckland is also the largest in New Zealand with over 20,000 students. The School of Engineering, one of only two in the country, will celebrate its ninetieth birthday in 1993. Features of the School which are a little out of the ordinary are the combined and very successful Department of Chemical and Materials Engineering, the Department of Engineering Science, and the country's only Department of Mining Engineering. The other three departments, which are the three largest, are Civil Engineering, Mechanical Engineering and Electrical and Electronic Engineering.

Auckland has three polytechnics which offer engineering courses at technician level. The qualification awarded, the New Zealand Certificate of Engineering, is well respected in the community and readily articulates into University study; this qualification route has had widespread acceptance over many years.

The Conference theme will be *Aiming for Quality in Engineering Education*. Papers are welcomed on any aspect of engineering education. Please start thinking now and plan to be in Auckland in December. We look forward to seeing you there!

Further information may be obtained from Prof. Roy M. Sharp, Dean of Engineering, School of Engineering, The University of Auckland, Private Bag 92019, AUCKLAND, New Zealand. Tel: +64 9 373 7599 ext. 7924 and fax: +64 9 373 7464.

PRESIDENT'S REPORT - AAEE 1992

It is a pleasure and honour to report on the variety of activities that the Australasian Association for Engineering Education organised and conducted in 1992. The report covers the twelve months of activity of the Association between 1 December 1991 and 1 December 1992 - a level and range of activities of which we can all be proud.

The Association is a Technical Society of The Institution of Engineers (Australia) and a Group within the Institution of Professional Engineers, New Zealand, for which we receive support, promotion and the potential to attract many members from the engineering profession.

Though the Association is barely four years old, it has grown rapidly over the last year to become the second largest such association in the world, behind only the American Society for Engineering Education, which is over 100 years old. Our Association has now attracted over 500 members through different grades of membership. It consists of 9 institutional members (representing 114 academics), 2 industrial members (20 members) and 406 individual members, including 53 from overseas.

The Association's finances are healthy, due to the growing number of members, several successful activities which brought a considerable revenue and excellent management of resources. The financial future of the Association looks extremely good.

During the year, the Executive Committee held four meetings, in December 1991, February, May and October. Another meeting of the Executive was held prior to the Annual Convention.

One of the prominent activities has been, and still is, the publication of the AAEE Newsletter. Three issues of the Newsletter have been circulated this year. Also, the *Australasian Journal of Engineering Education* is now printing its fourth volume, with a special issue dedicated entirely to the 3rd World Conference on Engineering Education held at the University of Portsmouth, UK, in September 1992. This year the Journal published three issues with the third being dedicated to academia/industry collaboration. In particular, the Journal has established itself as an important source of information on engineering education, publishing papers from all corners of the world. The efforts of Zenon J. Pudlowski as Editor of both publications are most warmly recognised.

Members of the Executive Committee took an active part in several local and international meetings on engineering education. Several members of the AAEE and its Executive were particularly visible at the 3rd World Conference on Engineering Education. The high profile of our Association was reflected in the omnipresence of Dr Z.J. Pudlowski, and in keynote addresses by both Professor Trevor Cole and myself.

Also during the year, progress was made in preparations for the 2nd East-West Congress on Engineering Education to be held in Lodz, Poland in September 1993. Our Association is proud to be one of the co-sponsors of this important international gathering of engineering educators.

Extremely successful 4th Annual Convention and Conference was held at The University of Queensland under the Chairmanship of Professor John Simmons. The Conference attracted over 150 participants, the majority of whom presented their research findings on engineering education. This sequel of annual conferences has become an important event in the Australasian calendar for engineering educators to report on their innovations and achievements and celebrate our noble cause. We are particularly pleased to announce that the Fifth Annual Convention and Conference will be held in Auckland, New Zealand.

A survey of engineering education in Australasia was completed early 1992. It is envisaged that the findings will be published early next year as a separate volume and distributed amongst AAEE members. Much appreciation is extended to Scott Grenquist for his research

and preparation of this material for publication.

As President I am satisfied with the level of achievements of our Association and look forward to another successful year. I wish to thank all AAEE members for their contributions to the advancement of our Association. I especially ask them to bring their colleagues into our Association, to enhance the quality of engineering education and its relevance to the national interest.

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

SECRETARY/TREASURER'S REPORT

There has been a significant increase in the AAEE membership since this time last year. Members have increased from 196 to over 500. This has resulted in an increased workload to maintain records and the distribution of material to members such as our Newsletter and Journal.

A significant shift in emphasis on administration has been the IEAust membership renewal notice indicating that members may pay their society membership through the IEAust. This option has been taken up by many members; however, quite a number have opted for sending their Association subscription direct. This latter approach has meant that we have needed to determine whether the full \$35 AAEE amount was applicable or only \$20 where an application to the IEAust for the \$15 subvention has been made. A difficulty here has been that in a number of cases some members have nominated other societies as their first choice and hence the subvention (\$15) from the IEAust is not applicable. Again, some members have not indicated on the application form/renewal notice whether the AAEE is/is not their first choice.

To avoid such difficulties it is recommended that members pay direct to the IEAust. Of course, non-members of the IEAust can certainly pay direct to the AAEE. We also note that some members have still not paid for 1992. Members in this category are reminded to remedy this situation.

Executive Committee meetings have been done through teleconferencing facilities originating at The University of Sydney. As the President is at Monash University this has been designated as the meeting place. As well as these two places, other places involved in teleconferencing include Telecom Research Laboratories, The University of Adelaide, The University of Queensland and the IEAust., Canberra. On one occasion the IEAust., Melbourne was also involved.

Our financial situation is firm at the 30/11/92 as shown in the auditor's report (copies available on request).

*Dr William N. Roebuck
Department of Electrical Engineering
The University of Sydney
Secretary/Treasurer*

BRIEF SUMMARY OF ACTIVITIES CARRIED OUT BY THE EXECUTIVE IN 1992

Last year was the fourth year of operation of our Association. The Executive Committee held four meetings over its term, and over the entire period of time the Association has experienced a significant increase of membership due to the support and advertising conducted through the publications of The Institution of Engineers, Australia. The

Association has strengthened links with our umbrella organisations, such as The Institution of Engineers, Australia (IEAust.) and The Institution of Professional Engineers, New Zealand (IPENZ). Overseas involvement also was increased significantly by attracting over 50 personal members from many countries throughout the world.

The *AAEE Newsletter* and the *Australasian Journal of Engineering Education* provided an efficient forum through which members could air the issues and problems of significance for engineering education (see President's Report). The *Australasian Journal of Engineering Education* published a special edition (Vol.3, No.3) on *Industry and Academia* with Prof. John Agnew as the Guest Editor.

The AAEE is actively involved in the preparations for the *2nd East-West Congress on Engineering Education*, to be held at the Technical University of Lodz, Poland, 20-24 September 1993. This is an international activity through which the Association is particularly visible on the international arena. Over 30 paper proposals were received from Australasia and it is hoped that Australasian participation at the Congress will be again noticeable. It was encouraging to see that our members made a strong impact on the outcome of the *3rd World Conference on Engineering Education* which was held at the University of Portsmouth, UK, in September 1992.

The 4th Annual Conference of the AAEE held at The University of Queensland was a huge success. It attracted over 150 individuals and over 130 papers were presented at the Conference. It is worthwhile mentioning that apart from a wide representation by academics, the Conference provided a much broader spectrum of topics and opinions by having representatives from private and public industry. The AAEE annual Medals were awarded to Prof. Terry V. Duggan (International) and Dr Brian E. Lloyd (Australasia).

At the 4th Annual Convention held on Sunday, December 13, annual reports concerning the status of the AAEE were presented by the President, Professor Peter LeP Darvall and the Secretary/Treasurer, Dr William N. Roebuck (see Annual Reports). Much of the discussion centred around the issues raised in the report. The general meeting elected a new Executive Committee consisting of twelve individual members of the AAEE.

At its first meeting, held after the Annual Convention, members of the Executive Committee elected the Executive Officers. The Executive Committee is:

President: Prof. Peter LeP Darvall, Monash University, Victoria, Australia.

1st Vice-President & Executive Director: Dr Zenon J. Pudlowski, The University of Sydney, New South Wales, Australia.

2nd Vice-President: Mr Harry Wragge, Telecom Australia, Victoria, Australia.

3rd Vice-President: Prof. David G. Elms, The University of Canterbury, Christchurch, New Zealand.

Secretary/Treasurer: Dr William N. Roebuck, The University of Sydney, New South Wales, Australia.

Member: Prof. Trevor W. Cole, The University of Sydney, New South Wales, Australia.

Member: Prof. Peter Parr, University of Technology, Sydney, New South Wales, Australia.

Member: Prof. Roy M. Sharp, The University of Auckland, Auckland, New Zealand.

Member: Prof. John M. Simmons, The University of Queensland, Queensland, Australia.

Member: Ms Elizabeth Taylor, University of Technology, Sydney, New South Wales, Australia.

Member: Ms Jane Varcoe, The University of Newcastle, Newcastle, New South Wales, Australia.

Member: Mr Ted Whitehead, The Institution of Engineers, Australia, Canberra, Australia.

AAEE MEDALS FOR DISTINGUISHED CONTRIBUTIONS TO ENGINEERING EDUCATION

For the second time the AAEE awarded its Medals for distinguished contributions to engineering education at the Annual Convention, this time in both divisions. The 1992 AAEE Medal (International) was presented for the first time, and Professor Terry V. Duggan, Dean of Engineering at The University of Portsmouth, UK and the Chairman of the International Liaison Group on Engineering Education received this award. Presenting the solid sterling silver medal the AAEE President, Professor Peter Darvall, read the following citation:

The 1992 Medal of the Australian Association for Engineering Education (International) is awarded to Professor Terry Duggan, Permanent Dean of Engineering at the University of Portsmouth.

Professor Duggan has made great contributions to engineering education in the UK, in Europe, and internationally. His zest and enthusiasm are legendary. Professor Duggan has a PhD in aeronautical engineering. He is a Fellow of the Institute for Mechanical Engineers. He had wide industrial experience particularly with the Rolls Royce company before joining the Portsmouth Polytechnic in 1965, where he rose steadily through the ranks, expanding his interests and capabilities as a senior engineering academic, until obtaining his present position in 1988.

He has projected himself and his Institution well beyond the immediate demands of his position, creating a dynamic Faculty of Engineering in the process. His own academic interests, ranging from engineering education through manufacturing and systems engineering, and materials engineering to environmental engineering, continue unabated. He has supervised a great number of higher degree students and has been external examiner for many other PhD students for other universities. He is the author or co-author of eight books and published over 120 papers, many in the field of materials engineering and engineering education.

He has presented papers and undertaken lecture tours throughout the world, including Australia, Austria, Canada, China, France, Germany, Hong Kong, India, Indonesia, Japan, Malaysia, The Phillipines, Poland, USSR, Singapore, Sweden, Thailand, Taiwan, and the United States. He is a committed European and has co-ordinated joint study programs with partner institutions in France and Germany. He is active in developing international co-operation and argues that Europe must look outwards, particularly towards the Pacific Rim. He is a British Council Specialist Adviser and Co-ordinator for a project concerned with environmental engineering in the Philippines. In 1980 he was awarded an Honorary Professorship of the Shenyang Institute of Aeronautical Engineering in China.

Professor Duggan has extensive experience in course development, including Bachelors and Masters degrees courses in Civil, Electrical, and Electronic and Mechanical Engineering, Engineering Systems, Manufacturing Systems Engineering, and Integrated Engineering, together with PhD and MSc programs in various areas. He has also considerable validation experience covering a wide spectrum of undergraduate and postgraduate courses.

Under his leadership the Faculty of Engineering at Portsmouth has a growing international reputation as both pioneering and innovative. Three years ago it was awarded "outstanding" ranking for every part of its curriculum.

Professor Duggan was Chairman of the recent very successful World Conference on

Engineering Education held at Portsmouth. During that conference, Professor Duggan was elected President of the International Liaison Group on Engineering Education. Anyone who has experienced the energy and warmth of Professor Duggan will understand how he has been so effective, and how he has done so much for engineering education.

In recognition of his outstanding achievements in engineering, and for his enthusiastic connection with the world of engineering education, including the part belonging to the Australian Association of Engineering Education, we are pleased to award our 1992 International Medal to Professor Terry Duggan.



Prof. Terry V. Duggan receives the 1992 AAEE Medal (International) from the AAEE President, Prof. Peter LeP Darvall.

The Deputy President of The Institution of Engineers, Australia, Dr Brian E. Lloyd, was the recipient of the 1992 AAEE Medal (Australasia). In recognition of his outstanding contributions to engineering education the AAEE President presented the following citation:

The 1992 Medal of the Australian Association for Engineering Education (Australia) is awarded to Dr Brian Edmund Lloyd.

Dr Lloyd has made great contributions to engineering education in Australia over a long period of time, though he is not a mainstream academic. His qualifications include a Diploma in Electrical Engineering, a Diploma in Business Administration, and a Master of Arts and Doctor of Philosophy from the University of Melbourne for research into the Social and Historical Development of Engineering in Australia. He has long experience in engineering design, in senior engineering management and in consultancy practice and education in the engineering labour force. He has given distinguished service to the Institution of Engineers and is now Deputy President. He will be President in 1993. He has already been honoured as a Member of the Order of Australia in 1984 for contributions to engineering and education, and has received several other honours.

He has published several books on engineering education, manpower and management in addition to several on Australian history as a recreational activity. For nearly thirty years I have had a copy of his first co-authored book 'The Education of Professional Engineers in

Australia' on my bookshelf. Through I found this book to be a very valuable source when, in the early 1970s I studied for a Diploma of Education, the book has not, like and nature of engineering education was not in those days, such a burning issue as it is now. It has been, to a significant extent as a result of the work of Brian Lloyd that issues in engineering education have moved to centre stage. This early book was followed by several others with his co-authors, covering manpower, organisation, and other issues. The books number some ten in all.

He has been engaged as a consultant undertaking organisational reviews and position classification studies for engineering organisations in several states, and taken a leading role in developing and presenting management short courses. He prepared the conceptual design of the very successful Association of Professional Engineers of Australia Postgraduate Diploma in Management. He led a consultancy group to prepare for the Victorian Education Foundation, a book on 'New Pathways in Engineering Education', which, as many of us know, has partly set the agenda for engineering education. As a corollary, he and his partners have been assigned to develop engineering degree and technology courses for Latrobe University and the University College of Northern Victoria. He and his colleagues have made a major contribution to the development of national competency standards for engineers, technologists and associates.

He has also filled important positions in the development and accreditation of TAFE courses and has been a member of the Engineering Advisory Committee of the Victorian Post Secondary Education Commission. He became inaugural National Chairman of the Society for Engineering Management, Australia, in 1990.

In recognition of all these contributions and others not mentioned for the sake of brevity, the Australasian Association for Engineering Education is pleased to award its 1992 Medal for Australasia to Dr Brian Lloyd.

Dr Brian E. Lloyd is presented with the 1992 AAEE Medal (Australasia) by the AAEE President, Prof. Peter LeP Darvall.



Dr Brian E. Lloyd is presented with the 1992 AAEE Medal (Australasia) by the AAEE President, Prof. Peter LeP Darvall.

Both recipients of the 1992 AAEE Medals presented keynote addresses. The addresses have been submitted for publication in the *Australasian Journal of Engineering Education*. It is envisaged that the papers will appear in Vol.4, No.2. The AAEE Executive Committee wishes to continue the award of the AAEE Medals in 1993.

A call for nominations

The AAEE Medal for Distinguished Contributions to Engineering Education was established in 1991 with its Australasian division. In addition to the Australasian division in 1992 the AAEE Medal was extended into the international arena by introducing its International division.

The recipients of these sterling silver medals will be invited to give keynote addresses at the forthcoming 5th Annual Convention and Conference on an aspect of their interests and work in engineering education. Also, the medalists will be invited to submit their addresses for publication in the *Australasian Journal of Engineering Education*.

The purpose of these AAEE Medals is to recognise outstanding contributions to engineering education, both in Australasia and overseas. Such contribution will be identified by books, research papers, reports, journal and conference publications, engagements and achievements in activities carried out by engineering education organisations, etc.

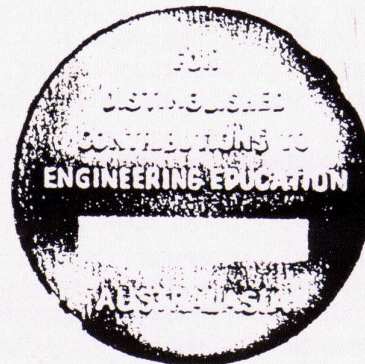
Only members of the AAEE are eligible to nominate candidates for the award of these AAEE Medals. To be eligible for the award of an AAEE Medal (Australasia), a candidate must be a member of the Australasian Association for Engineering Education and his or her research and other activities must have been carried out in Australasia.

Nominations are hereby invited. They should include a comprehensive statement by a proposer(s), and should include a curriculum vitae, a list of publications, relevant samples of publications, and a thorough evaluation of the candidate's work and achievements carried out by the proposer(s). Nominations which are incomplete by the closing date will not be considered. The Executive Committee of the AAEE reserves the right not to proceed with the award of medal(s) and/or to nominate its own candidate(s) at a meeting of the Executive.

Nominations are confidential and should be addressed to:

Professor Peter LeP Darvall
AAEE President
Faculty of Engineering
Monash University, Clayton, VIC 3168
Australia

The deadline for nominations is August 31, 1993.



Picture above shows the AAEE Australasian Medal (actual size).

COMPETENCY STANDARDS FOR GOOD AND EVIL

Introduction

As a proponent of competency standards for engineers, technologists and associates, I am also a realist. I have always been concerned about where the balance of good and evil might lie. My standpoint is that if we are aware of the risks, and take positive attitudes, the profession and the work force can be enhanced through judicious use of Standards. The IEAust has completed the first phase of National Competency Standards (NCS) for Professional Engineers, Stage 1 (graduate) and Stage 2 (experienced level). Use is being made of the NCS in new criteria for Corporate Membership of IEAust. This paper concentrates upon engineers.

Zealots and fundamentalists

I sympathise with those who are suspicious concerning the mythology, ideology, dogma and fundamentalist zeal surrounding competency standards. Competency fundamentalists have much in common with economic rationalists and extremist labour market economists. All have faith in the free market, and set themselves above human values and common sense. The fundamentalists expect competencies for professions to be encapsulated in a few pages of politically correct prose. In the competency Utopia everyone is free to demonstrate ability to do anything. In the limit, this overthrows education for professions and puts us back to the days of pupillage, when the novice learned by doing and self-teaching under a master.

Political correctness decrees that input statements about knowledge, or anything that smacks of education or potential, must be shunned. It is held that competencies are outputs - what people can do, no matter how ability 'to do' is acquired; knowledge can be inferred from doing. While we hold that graduates from accredited courses ipso facto are competent to begin practice, and that the degree provides potential for further competencies through development and experience, the bureaucratic responses are: 'Standards are about assessment of what individuals can do, not about their potential. Unless undergraduates are assessed against each performance criterion, how can they meet the Standards?' This kind of unreality is at the core of the problem presented to professions in dealing with competency bureaucrats of this kind.

Knowledge and competency

Let us take a sensible look at professional competency. The first step is to understand that there has to be a professional knowledge base. The second is to translate the inputs of knowledge into the proficiencies that provide the capacity for competent performance. The third is to relate these to what a profession really is. Fortunately, fundamentalists do not hold complete sway: a couple of politically correct quotes set the scene. In discussing the content of competency standards, the National Training Board makes several definitive propositions [1]:

- * The Board's 'approach to standards ... recognises that performance is underpinned by knowledge and understanding ... It is important to take account of the role of general competencies in the broadening of standards...
- * A competency-based system seeks the integration of knowledge, skills and application. A key aspect of competency is the application of knowledge. Performance of a task commonly draws upon a body of knowledge and understanding.
- * Moreover, the transfer of competency to new situations may not be fully achievable without knowledge and understanding. This is especially true where the work requires an understanding of the whole process, an integrated approach to quality, and/or the use of judgement and initiative.

- * Underpinning knowledge will often need to be assessed in order to be assured that the person understands the *why* as well as the *how*. This is essential for transferability of the skill across the stated range. What is being tested in a competency situation is how knowledge is applied, or may be applied, in the future.

The NTB holds to these principles for occupations below para-professional level. They are of crucial importance to professions. The need for a sound understanding of the underlying theoretical principles is stated in another way by Dr Neil Johnston, Deputy Secretary of the Department of Employment, Education and Training [2]:

One point I would like to make clear at the outset ... is that all stakeholders in Australia considering or developing competency-based standards have all rejected the narrow task or behavioural approach which was used and subsequently discredited in the 1960s and 1970s. The approach adopted by the National Training Board, Mayer Report, NOOSR and others all advocate a broad concept of competence embracing skills, knowledge and other criteria such as understanding and transferability ... the limited behaviourist model encompassing the measurement of narrowly defined parts of performance has been essentially rejected by all stakeholders ... in favour of a broader definition which encompasses knowledge, skills and other criteria such as understanding, transferability and attitudes.

Thus, the mere observation or documentation of performance cannot measure the essential professional characteristic of understanding fundamentals that underlie ability to develop new competencies and adapt to different tasks and circumstances.

Development of professional competencies

Professionals produce outcomes from self-identified problems and functions, many not foreseeable, and varying in specific tasks even in the same discipline and field. They must be able to transfer from one context to another, and to innovate and cope with non-routine activities. Knowledge and skills have been accumulated over decades in response to evolution of physical and social sciences and technologies, and work organisation and practices. Professional education, shaped by such evolution, imparts basic analytical and creative abilities as prerequisites to the advanced concepts and practices - all preconditions of competent performance. Because of the wide diversity of professional engineering disciplines and roles, it is not possible to circumscribe its complexity other than by generic competency definitions, as prepared by IEAust. However, I foresee discipline, industry and enterprise adaptations. Evaluation against generic Standards must not be mechanistic or reductionist, but holistic.

While recently in the UK, I observed briefly work on competency definition for professional engineers in the construction and process industries. The approach is extraordinarily detailed, leading to National Vocational Qualifications, made up of small groups of competency units, and intended as benchmarks in professional development. Since NVQs cannot include functions arising from new applications or technology, innovation might be shunned as not leading to an NVQ. With so much detail, and potential to inhibit change, these competency standards might stultify creativity and development. Alternatively, they might be ignored.

Professional proficiencies

Adaptability depends upon theoretical understanding, knowledge and skills. Knowledge is not a competence until it is reflected in an output. The attributes, capabilities and aptitudes supporting competency may be encapsulated in the idea of 'proficiencies', defined as:

Proficiencies: the essential underlying components of the knowledge, theoretical understanding and skills in mathematics, basic science, engineering sciences, advanced engineering concepts and practices, and related business and management, that enable Professional Engineers to exercise ranges competencies and achieve sound commercial, environmental and social outcomes, such that benefits, costs and risks are appropriately balanced. In acquiring such attributes, the Engineer must gain knowledge, skills, attitudes and competencies applied

in analysis, conceptualisation and generalisation of problems and solutions, providing the basis for the flexibility to adapt to new and unforeseen factors within a changing, complex and uncertain environment of professional practice.

Proficiency has an output connotation in describing the prerequisites for competent performance. The generic proficiencies required for entry to the profession come from the criteria for accreditation of professional engineering courses, and are shown in Figure 1.

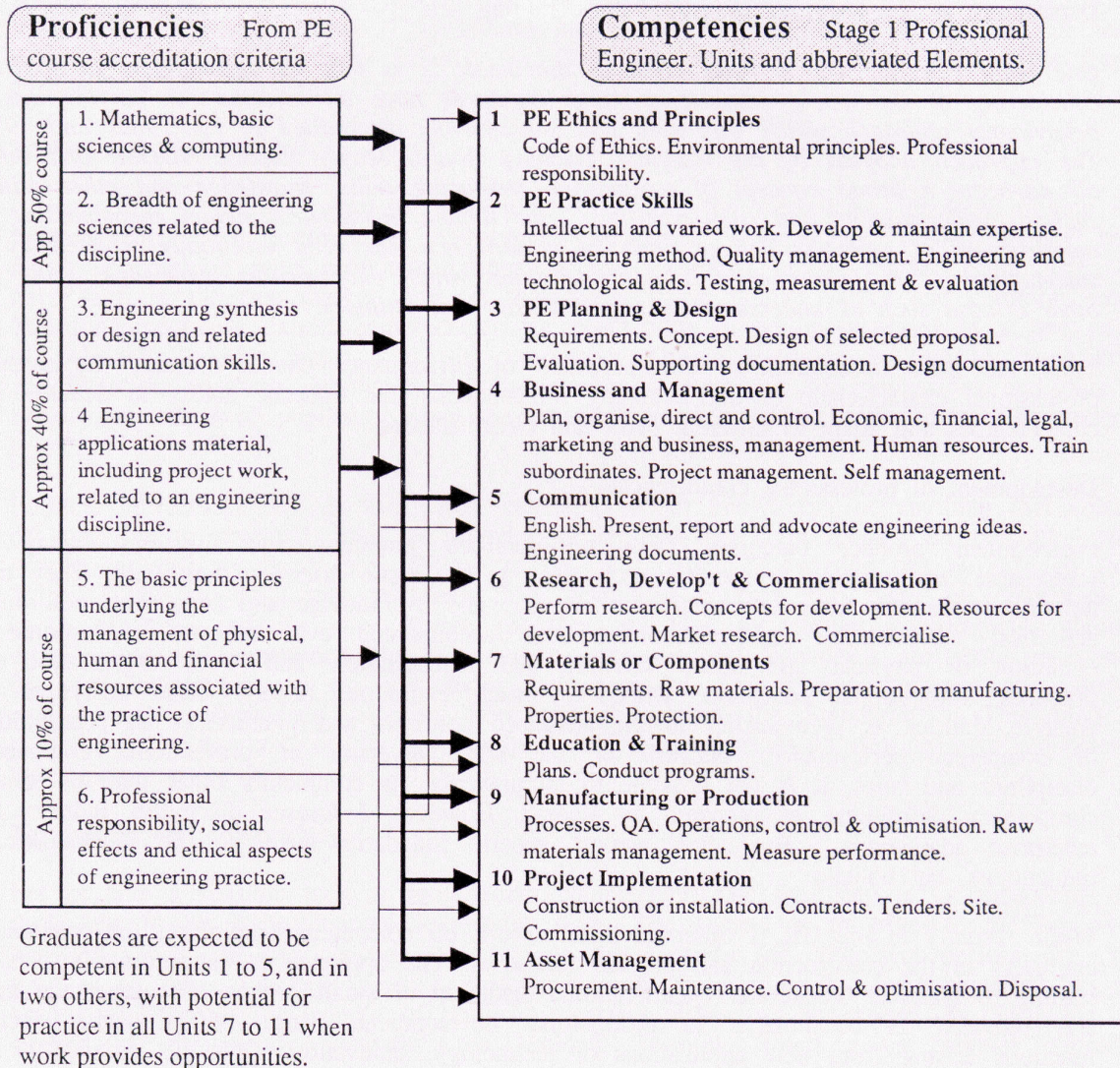


Figure 1: Connections between proficiencies and competencies for Stage 1 (Graduate) Professional Engineers.

A competent and proficient profession

Neither generic nor detailed competency definitions can encapsulate all attributes required of a professional person. When taken in isolation, Units, Elements and Performance Criteria inevitably fail by insufficiency. Competencies must be augmented by knowledge, as translated into output-related proficiencies that underlie the capacity, capability and aptitudes essential to competency. The connection is made in Figure 1 between Competencies and Proficiencies.

For these reasons, as stated in the IEAust Standards, competency definitions for Stages 1 Professional Engineers rest upon possession of an accredited professional engineering qualification, or an equivalent educational formation. With such an understanding of our profession, the approach to development of standards therefore must be informed by a definition on the following lines:

Engineering is a profession based upon a body of distinctive knowledge, directed to the satisfaction of a beneficial social need. Professional Engineers undertake varied work conducted on a high intellectual plane, requiring discretion and judgement, having its base in proficiencies and competencies derived and extended in tested research and experience and acquired through educational and professional formation, and expressing a group consciousness of professional ideals concerning social and ethical responsibility and service.

Concluding remarks

The focus of the NCS for Professional Engineers has to be upon what is done in professional engineering work. This discussion shows that there is authoritative acceptance of the self-evident truth that knowledge is the essential foundation for competent performance. The output-orientated concept of proficiencies provides a useful means of linking fundamental and advanced theoretical knowledge to the capacity for versatility, and to the essential prerequisites of competent performance.

The NCS are not about competence-based learning or assessment, and do not impose anything upon the undergraduate educational process or curricula. It is accepted that there is a great diversity of ways in which undergraduates may be formed, and IEAust wishes to encourage diversity. In introducing the NCS document, the Institution states the following principles:

- * The Institution recognises the benefits of formulating competency standards, and of applying them in the evaluation of migrants, stimulating continuing professional development, recognising levels of expertise and the maintenance of professional and technical competence. Such functions are the province of the professional bodies, in consultation with employers, educational institutions and other related agencies and organisations.
- * The Institution affirms that competency standards developed by the engineering profession remain the property of that profession, which is responsible for applying and exercising quality control over such standards.
- * The Institution will not seek to have these competency standards endorsed by the National Training Board or recognised by any Competency Standards Body, although where appropriate, the Institution may conclude an agreement or agreements with such boards or bodies to foster co-ordination of standards for professional and para-professional occupations.
- * The Institution fully endorses the professional responsibilities of academic staff for determination of course structure and teaching method, and supports higher education institutions in their assertion of independence in such matters. In accrediting undergraduate courses, the Institution may use competency standards for entry level to the profession to assess the suitability of educational outcomes to prepare individuals to practise. However, such use of standards will not be prescriptive, and will remain within the co-operative professional framework of accreditation as currently conducted.
- * The Institution confirms the long-standing principle that all graduates from accredited courses will continue to receive professional recognition at entry level without being subjected to any additional competency-based evaluation or assessment for that purpose.

The Institution therefore has determined its own agenda for the NCS, and is showing the

way for some other professions in resisting the evils of bureaucratic domination of our profession.

- 1] National Training Board, National Competency Standards, Policy and Guidelines, Second Edition, Canberra, October 1992, pp. 29, 34, 35.
- 2] Johnston, H. N. The Universities and Competency-based Standards. *Proceedings of Higher Education and the Competency Movement*, ANU, 3 June 1992, pp. 1, 9.

Dr Brian E. Lloyd
Deputy President
The Institution of Engineers, Australia

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.

2ND EAST-WEST CONGRESS ON ENGINEERING EDUCATION

Members of our Association have received an invitation to attend 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, Poland, between 20 and 24 September, 1993. This is the second international meeting to be organised jointly by Australian and Polish academics.

The response from the international community of engineering educators may be regarded as excellent with the submission of over 150 abstracts and with over 200 expressions of interest in attending the Congress from a total of 25 countries. The paper proposals seem to cover almost every aspect of engineering education with a substantial input from academics representing many new countries in Central and Eastern Europe. Again, the largest number of submissions was received from Australia with the United Kingdom slightly behind.

Potential participants are reminded 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.

INTERNATIONAL CONGRESS OF ENGINEERING DEANS AND INDUSTRY LEADERS

An International Congress of Engineering Deans and Industry Leaders 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) under the chairmanship of Mr Pierre Giraudet. It is the outcome 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. Both meetings were sponsored by UNESCO, with appropriate engineering education groups invited to co-sponsor (eg ASEE, Engineering Dean's Council, SEFI, IGIP and AAEE).

These symposia were aimed at assisting technological development in developing countries by improving engineering education there through the efforts of concerned institutions in the developed countries. They resulted in the development of an action-oriented agenda of specific projects to be undertaken in areas such as: Sister University Programs, University-Industry Co-operation, Database on Engineering Education, Clearinghouse on Equipment and Courseware, Completion of Degrees, Educational Standards/Equivalency, Use of Satellite Technology, and Worldwide Organisation.

To implement the projects, UNESCO has recently established a UNESCO Steering Committee on Human Resources Development for Technical Industry Stimulation. The Steering Committee met in Paris (7-8 January 1993) to formulate action plans for the implementation of the projects. The Steering Committee consists of a dozen members, half from academia and half from industry. Dr Z.J. Pudlowski has been invited to join the Steering Committee. At the inaugural meeting of the Steering Committee he was invited to prepare a submission to UNESCO for the establishment of a UNESCO International Centre on Equipment and Courseware in Engineering Education. According to UNESCO, such a centre will be established in a leading tertiary education institution, preferably in Australia, or in another country able to provide essential facilities and support for this enterprise.

It has been decided that UNESCO will attract financial resources for this Centre from agencies such as the World Bank, regional development banks, private foundations, etc. It is envisaged that the centre would undertake research concerning teaching equipment, teaching courseware and software, and the methodology of training utilised in engineering education. The centre would serve the world's engineering education community, with particular commitment to the transfer of expertise from developed to developing countries.

The Institution of Engineers, Australia, has already expressed its strong desire to support the establishment of this international centre in Australia. Also, it is hoped that the AAEE may consider its involvement in this project. In particular, the AAEE may help facilitate the establishment of the centre by providing available resources and expertise. Moreover, it may even wish to move its Headquarters in to the centre.

The organisation of such a centre requires the selection of the best university environment in which to operate. The Steering Committee has not, as yet, made any decisions concerning the selection of the host institution. However, it is envisaged that Dr Z.J. Pudlowski will make a recommendation as to the proposed host institution to the Steering Committee at a meeting of the Committee which is scheduled for June 1993, in conjunction with the International Congress. It is, therefore, imperative that the host engineering faculty be chosen on the basis of its staff expertise and involvement in engineering education, available resources and a long-term commitment to this project. The Australian Government strongly supports UNESCO and its activities, and it is the first time that a UNESCO international centre may be established in Australia. If an Australian engineering faculty is chosen, UNESCO will also approach the Australian Federal Government for additional financial support. Hence, a comprehensive process of consultation with all interested parties, and in particular with the deans of engineering faculties in Australia, must be carried out before the submission is tendered to UNESCO. Therefore, the engineering deans are kindly invited to express their views and suggestions on how to formulate the submission and organise this centre. Those interested in this idea please contact Zenon J. Pudlowski.

In addition to the implementation of specific projects, the Steering Committee has been

invited to develop the Technical Program for this *International Congress of Deans and Industry Leaders*. It is anticipated that the program will address a variety of issues concerning engineering education and industrial training, and in particular how they relate to the needs of developing countries. The Deans of leading Australasian engineering faculties should consider participation in this International Congress, as it is extremely relevant to our interest and commitment in providing assistance to developing countries in Asia and the Pacific region.

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.



Picture above shows executive members of the UNESCO Steering Committee on Human Resources Development for Technical Industry Stimulation presiding at the inaugural meeting at UNESCO Headquarters in Paris. Seated are (l-r) Prof. R.C. Jones, University of Delaware (Co-chairman); Dr B. Berkovski (Science Sector, UNESCO); Dr A. Badran (Assistant Director-General for Science, UNESCO); Prof. D.D. Glower, Ohio State University (Co-chairman) and Dr D. Lakhder (Science Sector, UNESCO).

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 address above.