

AUSTRALASIAN ASSOCIATION FOR ENGINEERING EDUCATION

NEWSLETTER

Vol.7, No.1

Melbourne, March 1995

7,23,0348



The 3rd World Congress on Engineering Education and Training was held at Cairo, Egypt, between 14 and 18 November 1994. The Congress was sponsored by the World Federation of Engineering Organisations (WFEO), UNESCO and the Supreme Council of Universities in Egypt (SCUE) and was organised jointly by the Faculty of Engineering at Cairo University and the Egyptian Syndicate of Engineers. Details about the Congress may be found elsewhere in this issue. The picture above shows a view of the magnificent city of Cairo, the pearl of the Arabic world.

AUSTRALASIAN ASSOCIATION FOR ENGINEERING EDUCATION

7th ANNUAL CONVENTION AND CONFERENCE

INTERNATIONALISATION OF ENGINEERING EDUCATION

AN INVITATION TO SUBMIT A PAPER AND TO ATTEND

Venue: The University of Melbourne, Australia

Dates: Sunday 10 to Wednesday 13 December 1995

Conference Chairman: Professor William W.S. Charters

The Seventh Annual Convention and Conference of the Australasian Association for Engineering Education will be held at The University of Melbourne, Melbourne, Australia from 10th to 13th December 1995 and will be organised in conjunction with the UNESCO Supported International Centre for Engineering Education (USICEE).

The University of Melbourne, the Conference host, is one of the most prestigious universities in Australia and is the second oldest university in this country. The Faculty of Engineering which produced the first engineering graduates in Australia in 1863 has been at the forefront of undergraduate education for over 130 years now and has been a leader in postgraduate research for over fifty years since its first Masters student graduated in 1941. In its continuing quest for quality teaching and research the Faculty bases its processes on international best practice in order to produce graduates who are highly acceptable world wide in the engineering profession.

The world has become a global community which now provides more opportunities for collaboration. The increased level of internationalisation of engineering education worldwide has placed Australasian academic institutions in a new, and challenging, situation as they endeavour to prepare their graduates for an international arena. Therefore, the Conference theme *Internationalisation of Engineering Education* was chosen to address this situation, and to discuss issues of concern. Although the Conference emphasis is on the main theme, paper proposals on all aspects of engineering education are cordially welcome.

The call for papers will be issued early in May 1995. Papers accepted will be published in full in the Conference Proceedings. Suggestions for demonstrations, exhibitions, workshops and other new techniques are sought in order to increase the variety and interest to the Conference Program. The Association's 7th Annual Convention will be held in conjunction with the Conference Opening Ceremony on Sunday, 10 December 1995.

Academic matters relating to the 7th AAEE Annual Convention and Conference will be handled by Assoc. Prof. M. Aldeen, Chairman of the Conference Organising Committee. The USICEE will provide managerial and organisational support, making this event a truly co-operative venture.

Further information on academic matters may be obtained from Assoc. Prof. M. Aldeen, Faculty of Engineering, The University of Melbourne, Tel: +61 3 344-7298, Fax: +61 3 344-6678, e-mail: moh@mullian.ee.mu.oz.au. All correspondence and other enquiries should be directed to USICEE, Faculty of Engineering, Monash University, Clayton, Melbourne, Australia. Tel: +61 3 905-4977, Fax: +61 3 905-1547.

PRESIDENT'S REPORT - AAEE 1994



Prof. Peter Darvall

It is my pleasure and honour to report to members of the Australasian Association for Engineering Education. This report spans the twelve months activity of the Association since the last AGM in Auckland on 12 December 1993, a year that has seen a further strong consolidation of the Association's position.

Highlights from the Association in 1994 have been the 5th Conference in Auckland, a visit by a delegation from AAEE to Russia and the continuing internationalisation of engineering education.

The AAEE 5th Annual Convention and Conference was held in New Zealand for the first time, in the School of Engineering at the University of Auckland. Close to 180 delegates attended and more than 130 papers were presented at this extremely successful conference. It was pleasing that over 100 Australians crossed the Tasman Sea and contributed to the conference. The theme was *Aiming for Quality in Engineering Education*, and among the invited speakers was Terry Duggan, winner of the 1992 AAEE Medal (International) for distinguished contributions to engineering education. The 1993 AAEE Medals were awarded to Professor David Elms (New Zealand) and Professor Russel C. Jones (USA). The conference provided a forum for broad debate and a wealth of ideas relating to engineering education and industrial training.

Quality Reviews and the ranking of academic institutions in Australia have been new factors in 1994. This process of ranking universities has definite implications for the future of university education in Australia and the image of Australian universities abroad. The possible damaging effect of this process on staff morale in many engineering schools is to be regretted. This Association, through its various activities, must continue the dialogue and collaboration between engineering academics from old and new universities. We must continue to support progressive changes in university engineering education, whatever the supposed *rank* of the institution involved.

A delegation representing this Association visited Russia from July 2 to July 15 1994 at the express invitation of the Russian Association for Engineering Education (RAEE). I was, unfortunately, unable to join the delegation because of other commitments. The delegation visited universities in Moscow and St. Petersburg and met with the Russian Federation Committee on Higher Education and the Minister-Chairman Dr Vladimir Kinelev, who had visited Australia in November 1993 with the Russian delegation.

The Australian delegation was delighted to be able to meet in Moscow with the Australian Ambassador, His Excellency Cavan Hogue at the Australian Embassy, the meeting also being attended by Roger James, the Senior Trade Commissioner. The visit of the AAEE delegation to Russia certainly continued the exchange of information and experiences between the AAEE and RAEE, as well as providing direct contacts with key academic staff of the Russian Universities.

The AAEE is a co-sponsor, with the Institution of Engineers, Australia, and other national and international organisations, of the 1995 *International Congress of Engineering Deans and Industry Leaders* to be hosted by the UNESCO Supported International Centre for Engineering Education (USICEE) and to be held at Monash University from 3-6 July 1995. The Congress is not just for engineering deans and industry leaders but provides the perfect opportunity for you all to contribute a paper in an international forum. The USICEE has initiated a number of actions in preparation for the Congress, to stimulate interest around the world and to ensure important issues will be raised at the Congress. Already a *National Symposium for Engineering Deans and Industry Leaders* has been held in Lodz, Poland and

an *International Conference on Engineering Education - An Indian Perspective* has been held in India. The Russian Association for Engineering Education will hold an *International UNESCO Conference on Engineering Education - ICEE'95* in Moscow between 23 and 25 May 1995.

The reputation and influence of our Association internationally brings credit to all Australasian engineering education professionals. Most technologically advanced countries do not have an engineering education society like ours, and having one is not a prerequisite for economic success. However, it seems to create a very favourable impression internationally that, not only do we have an engineering education society, but a strong and enthusiastic one which is widely respected in international forums.

Australian engineering schools, already amongst the most scrutinised higher education units in the world, are to be scrutinised again. The Australian Council of Engineering Deans, the Institution of Engineers, Australia, and the Academy of Technological Sciences and Engineering have been given approval by the federal government for a comprehensive *Review of Engineering Education* following a successful submission to the Department of Employment, Education and Training (DEET). The review's primary task is to explore the relationship between the engineering education system and students, industry and the profession, examine the structure, content and mode of delivery of the education program and examine the impact of institutional policies and systems. AAEE is keen to play an important role in this review.

After another memorable year, I wish to thank all AAEE members for their contributions during 1994 to the advancement of the Association. I particularly wish to thank Dr Bill Roebuck for his sterling services to AAEE as Secretary/Treasurer from 1991 until his resignation in March 1994.

I thank the members of the AAEE Executive Committee for 1994 for their substantial contributions. They were: Dr Terry Berreen, Professor Trevor Cole, Mr Scott Grenquist, Mr Gary Lane, Professor Peter Parr, Dr David Radcliffe, Professor Roy Sharp, Ms Elizabeth Taylor, Mr Ted Whitehead, Mr Harry Wragge.

Particular thanks are owed to Associate Professor Zenon J. Pudlowski, our first Vice-President and Executive Director, for his unrelenting dedication to the cause of engineering education.

Professor Pudlowski is a full-time staff member of Monash University, so that University should be thanked for the considerable time that he has spent in directing the affairs of the Association in 1994. For several years before this, it was the University of Sydney which made the same contribution. It is an admirable feature of universities that they recognise the legitimacy of such external professional responsibilities and the need to support them. Dr Pudlowski is also the Director of the UNESCO Supported International Centre for Engineering Education which, though a Monash Centre, is working for the enhanced reputation of all Australasian engineering educators.

I believe that our Association has played a very important role in making Engineering Schools in Australasia much more interesting and stimulating places to be. I would urge all members to spread their enthusiasm for engineering education to further increase our membership, and to make engineering education as exciting as it should be.

We all look forward to a successful year in 1995.

Professor Peter LePoer Darvall
Deputy Vice-Chancellor (R & D)
Monash University
President of AAEE

SECRETARY/TREASURER REPORT



A/Prof T. Berreen

Membership of the Association is now 329 members, plus 64 institutional members, a total of nearly 400. There have been some difficulties in determining membership due to members paying late, a certain amount of confusion over payment methods and some delays in receiving notification from the IEAust. A large number of unfinancial members have also been sent renewal forms for 1995.

Currently there are 270 subscriptions to the *Australasian Journal of Engineering Education* which is a net increase this year of 114. Again there were difficulties with the IEAust not informing the AAEE about the existence of over 130 subscriptions and not transferring the money. Fortunately this matter has been fully resolved.

The attached auditor's report shows that the financial position is strong with a balance of \$17,531.68.

The Executive Committee of the AAEE at its meeting (teleconference) held at Monash University on 1 September 1994 proposed that the subscription fee be raised from \$35 to \$40 with IEAust members who nominate the AAEE as their society of first choice paying \$25, and the IEAust providing a subvention of \$15 to bring the total to \$40. However no action on this will be taken until 1996. It is suggested that Association members who are also members of IEAust adopt the method of payment through IEAust. Non-IEAust members may pay their subscriptions directly and an opportunity is available at the Conference for this and for new members. Subscription to the Journal remains unchanged at \$30.

The Association is now an incorporated association in Victoria under The Associations Incorporation Act 1981. This has resulted in a number of changes to the by-laws of the Association, which were discussed and accepted at the last Annual General Meeting in Auckland.

May I thank you for your support and assistance on all matters relating to the administrative and financial arrangements of the Association. I would particularly like to thank Pat Kreuiter for her assistance in maintaining the database of members, organising and minuting meetings and the handling of financial matters.

Associate Professor Terry Berreen
Department of Mechanical Engineering
Monash University
Secretary/Treasurer of AAEE

A BRIEF REVIEW OF ASSOCIATION ACTIVITIES IN 1994

The AAEE has strengthened its local and international position and increased its activities throughout the sixth year of operation. The Executive Committee endeavoured to assist the President in his quest to raise the profile of the Association and to maintain the high standards of AAEE's activities. The management of the Association's database was a constant problem due to the difficulties that the Membership Division of the IEAust experienced in 1994. This was the most likely reason for a substantial loss of many AAEE members. We hope that this problem will be rectified in 1995. The AAEE Headquarters attracted some support from academics at Monash University, with Associate Professor Terry Berreen taking over as Secretary/Treasurer in April 1994.

The highlight of the sixth year of operation of the AAEE was the *6th Annual Convention and Conference* held at the Faculty of Engineering within the University of Technology, Sydney, and organised by a team of AAEE members under the leadership of Professor Peter

Parr, Dean of the Faculty of Engineering.

This Conference was a milestone in the history of our Association with over 260 attendees and with over 170 papers included in the *Conference Proceedings*. The Conference Organising Committee has set a standard which will be very difficult to replicate in our future AAEE meetings.

The success of the conference was the success of Professor Parr, who has gathered around him a team of excellent engineering educators: experienced, sensitive and particularly concerned about new ideas and world trends in engineering and technology education. His expertise, personality and leadership qualities have undoubtedly put the University of Technology, Sydney, in the forefront of engineering education locally and internationally.

On behalf of the AAEE President, Professor Peter LeP Darvall, the AAEE Executive Committee, and indeed myself, I wish to congratulate Professor Parr and his team on the marvellous job you all have done with the organisation of such a successful and memorable event.

On the publication front, I wish to report that four issues of the *AAEE Newsletter* were published in volume 6, with 72 pages of material concerning Association activities and issues of importance for engineering education. Several interesting and stimulating articles were included in this volume.

The *Australasian Journal of Engineering Education* published two issues with 200 pages of material. The first issue of volume 5 of the Journal was a special edition which included the 1993 Survey of Engineering Education in Australasia, compiled and edited by Scott Grenquist, a member of the AAEE Executive. The second issue (Vol.5, No.2) was entirely dedicated to the *2nd East-West Congress on Engineering Education - Enhancing Engineering Education Research* which was held at the Technical University of Lodz (TUL), Poland, under the Honorary Chairmanship of Professor Jan Kryszinski, Rector of the TUL. A selection of opening and keynote addresses, as well as a number of selected Congress presentations, dealing with a variety of topics relating to engineering education, was included in this issue.

The 6th Annual Convention was held on Sunday, 11 December 1994, and annual reports concerning the status of the AAEE were presented by the President, Professor Peter LeP Darvall and the Secretary/Treasurer, Associate Professor Terry Berreen (edited versions of the reports are included in this issue). 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: Assoc. Prof. Zenon J. Pudlowski, Monash University, Victoria, Australia.

2nd Vice-President: Ms Elizabeth Taylor, University of Technology, Sydney, New South Wales, Australia.

3rd Vice-President: Mr Barry Drew, FESTO Didactic, Melbourne, Victoria, Australia.

Secretary/Treasurer: Associate Professor Terry Berreen, Monash University, Victoria, Australia.

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

Member: Mr Scott Grenquist, The University of Newcastle, New South Wales, Australia.

Member: Mr David Parson, The University of Southern Queensland, Queensland, Australia.

Member: Dr David F. Radcliffe, The University of Queensland, Queensland, Australia.

Member: Mr Jeffrey Stewart, University of Ballarat, Victoria, Australia.

Member: Prof. Mark S. Wainwright, The University of New South Wales, Sydney, New South Wales, Australia.

Member: Prof. Darrell Williamson, Australian National University, Canberra, Australia.

AAEE MEDALS FOR DISTINGUISHED CONTRIBUTIONS TO ENGINEERING EDUCATION

For the fourth time the AAEE awarded its Medals for distinguished contributions to engineering education at the Annual Convention. The 1994 AAEE Medal (International) was presented to Professor Jean Michel, Ecole Nationale des Ponts et Chaussées, Paris, France. Professor Michel is the Adviser to the Director and Editor-in-Chief of the *European Journal of Engineering Education*, a journal of the European Society for Engineering Education, better known as SEFI (Société Européenne pour la Formation des Ingénieurs). Presenting the solid sterling silver medal the AAEE President, Professor Peter Darvall, read the following citation:

Prof. Jean Michel is currently Adviser to the Director of Ecole Nationale des Ponts et Chaussées (Paris, France) for the management of education and information. Previously he was Director of the Pedagogical Documentation and Communication Centre of this institution.



Prof. Jean Michel receives the 1994 AAEE Medal (International) from the AAEE President, Prof. Peter LeP Darvall.

He is also President of the Committee of Engineering Information of WFEO (World Federation of Engineering Organizations), President of the French Association of Information

Professionals and Editor of the European Journal of Engineering Education, a journal of the European Society of Engineering Education (SEFI).

Prof. Michel is actively working as a consultant in the fields of information and documentation management, value analysis and associated methods like problem solving and creativity and, of course, engineering education and information professionals education. In this latter field he has organised many seminars and conferences in Europe, America and Africa and acted as adviser to national and international institutions like SEFI, the European Community and UNESCO.

He has published several books and more than 200 papers, many devoted to the improvement of engineering education, in different French or international journals, as well as acting as invited lecturer and keynote speaker at international conferences on engineering education organised by various bodies in a number of countries.

Prof. Michel is a Chevalier in the French Orders of Arts et Lettres and Palmes Académiques and the German Order of Merite. His particular achievements are in developing innovative teaching methods and in facilitating contacts between Technical Universities and international bodies.



The AAEE President, Prof. Peter LeP Darvall, presents the 1994 AAEE Medal (Australasia) to Prof. Emeritus Hugo K. Messerle.

The 1994 AAEE Medal (Australia) was presented to Professor Emeritus Hugo K. Messerle in recognition of his outstanding contributions to engineering education. The AAEE President presented the following citation:

Hugo Karl Messerle retired in 1991 as Head of the School of Electrical Engineering of the University of Sydney and was appointed Emeritus Professor of that institution. In the areas of engineering research and education he has made substantial contributions both in Australia and overseas. At Sydney University he built up a strong research effort in electrical engineering and engineering education. Through the development of a close contact with industry he was able to maintain effective undergraduate programs, a diverse

post-graduate program and a strong research effort in the School. These were complemented by his interest in continuing education. His involvement in engineering education is documented in several teaching texts and numerous papers.

In 1989 he was the Chairman of the 2nd World Conference on Engineering Education. This conference attracted leading educators from around the world and resulted in the formation of the International Liaison Group on Engineering Education (ILG-EE) with Prof. Messerle as its first chairman. Subsequently he was elected as a Director to the Council of the International Association on Continuing Engineering Education (IACEE).

Apart from presenting papers at many conferences, Prof. Messerle has given numerous invited lectures and seminars at universities and research institutes in the USA, Germany, the UK, the Netherlands, the USSR, Poland, Israel, China, India, Switzerland and Austria. He was invited as special lecturer by the IEEE to travel around South-East Asian countries in 1988 and to give lectures on advanced electrical power topics and new developments in engineering education.

His close collaboration with industry led to the establishment of the Electrical Engineering Foundation in 1982/3, an initiative which has been strongly sponsored by industry and which grew and flourished under his Directorship.

The recipients of the 1994 Medals presented keynote addresses on this occasion. It is envisaged that both addresses, plus other interesting selected papers which were presented at the Conference, will be published in a special issue of the *Australasian Journal of Engineering Education*. The AAEE Executive Committee wishes to continue the award of the AAEE Medals in 1995.

A call for nominations

The AAEE Medal for Distinguished Contributions to Engineering Education was established in 1991 with its Australasian division. Z.J. Pudlowski was the recipient of the Inaugural Medal. In addition to the Australasian division, the AAEE Medal was extended in 1992 into the international.

The recipients of these sterling silver medals will be invited to give keynote addresses at the forthcoming 7th Annual Convention and Conference on an aspect of their interests and work in engineering education. Also, the medallists 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.

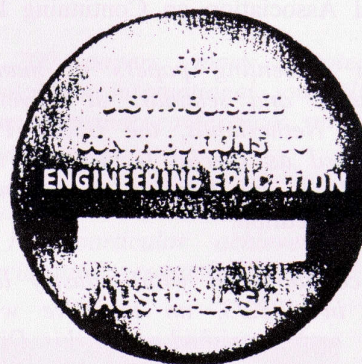
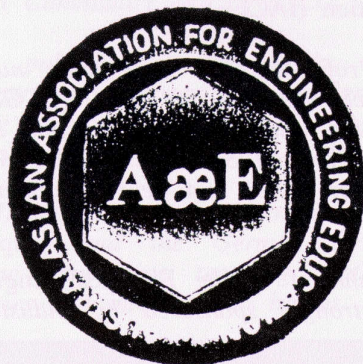
Only members of the AAEE are eligible to nominate candidates for the award of these AAEE Medals. To be eligible for the award of an AAEE Medal (Australasia), a candidate must be a member of the Australasian Association for Engineering Education and his or her research and other activities must have been 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
Deputy Vice-Chancellor (R & D)
AAEE President
Monash University, Clayton, VIC 3168
Australia

The deadline for nominations is 31 July 1995.



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

A CALL FOR RENEWAL OF MEMBERSHIP

At the 6th Annual General Meeting the Executive Committee did not seek to increase membership fees, and it was decided that membership fees for 1995 would remain the same as they were in 1994. 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 30 January each year, AAEE members who are corporate members of the IEAust are encouraged to renew their AAEE 1995 membership through the IEAust, using the IEAust's 1995 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.

3RD WORLD CONGRESS ON ENGINEERING EDUCATION & TRAINING - OPENING REMARKS



Prof. M. Yadarola

Your Excellency, the Minister of Education of Egypt, Professor Bahaa-El Din; Honourable Deputy Director General of UNESCO, Dr Adnan Badran; Mr President of the World Federation of Engineering Organisations, Dr William Carroll; Mr President of the Egyptian Syndicate of Engineers; Mr President and Mr Secretary General of the National Organising Committee; Dear colleagues, ladies, gentlemen:

Since its foundation in 1968, the World Federation of Engineering Organisations has been especially concerned about the formation of future generations of engineers and in 1975 decided to create a Permanent Committee, entrusting it with the task of analysing, discussing and advising on initiatives and methods to help fulfil this objective. Since its creation, the Committee has met every year, in different countries of the world, especially in those whose engineering organisations decided to invite and host its members.

Each annual session of the Committee has led to the analysis of important matters, and this activity has been further extended through regional and international conferences, seminars,

workshops and symposia, organised at the time of each meeting with the sponsorship of the host institutions.

WFEO has always had in mind the idea of giving these meetings periodical continuity, regularly arranging a World Congress that would become the major forum for discussion of problems related to engineering education. It was so approved at the Vancouver Assembly in 1987.

Asia was the continent that received the First World Congress on Engineering Education and Training, and the Nepal Engineers Association was the first member organisation of WFEO to take upon itself the responsibility of organising this meeting in the exotic city of Kathmandu, at the foot of the Himalayas. It began on a day like today, November 13, 1988. Three years later in 1992 with the hospitality of the National Society of Engineers and Architects of Cuba, America was the site of the Second Congress carried out in the unforgettable setting of that beautiful Caribbean island.

Today it is Africa, and the Egyptian Syndicate of Engineers is the host organisation receiving delegations of educators, engineers, professional and industrial leaders and government officers, all willing to analyse problems and propose the best solutions to promote the development of engineers in any country of the world with excellence as the common denominator.

Only engineers who are qualified to act in any environment, because they have been taught on the basis of a standard of quality common to all educational institutions, will be capable of giving impulse to sustainable development in each country, undertaking their roles within a global framework of the profession, a framework of competitiveness and efficiency, yet suited to environmental protection, for the use of physical, human and economic resources.

At a worldwide level, competitiveness is growing faster between economic countries and regions. Industries with high technology are dominating the leading sectors. A larger concentration of capital and a growing sophistication of the productive mechanism is taking place with larger productivity and higher quality as a result. International commerce is nowadays intensified with the gradual disappearance of barriers in customs and techniques. As a consequence, industries and other enterprises that support the economy of each country will have to modernise and strengthen their structure to meet the new demands of an open market.

Technological development will be more and more dependent on research, towards which universities and leading companies will have to dedicate larger investments, and the discoveries will be incorporated more rapidly into the production of goods and services. The generalised presence of computers, electronic devices and robotics will alter the relationship between capital and work with more and more intensive use of computerised machines, easily adaptable to new production lines, thus implying that the new industrial structure will be characterised by its flexibility.

Information, which today is a key consumer good in social interrelationships, will need people who will be able to benefit from it at the right moment. We engineers should be in a position to control, manage and apply the flow of information, and to educate others to be capable of taking part in the process of application and in the classification and selection of the knowledge integrated to that flow of information.

I believe that in a new solidary world, knowledge should no longer have nationality or absolute owners and should become the social property of mankind. It is to be hoped that this statement will be true very soon, but for this to happen, developed countries and their leading enterprises must be willing to share their knowledge with developing countries. This must happen especially in those selected areas that display creative advantages in generating a comparatively larger aggregate value to their raw materials and energy inputs. Undoubtedly, a stream of knowledge will also be generated in the reverse direction, since intelligence is not the exclusive property of the more developed countries or their efficient

enterprises. As Bernard Shaw would say, *If you have an apple and I have an apple and we exchange them, in the end each of us will still have one apple. But if each of us has an idea and we exchange them, at the end each of us will have two ideas.*

A lot is said in the leading countries of the world about aiding in the development of the countries less favoured by progress. If they are really convinced of this need they should start by sharing knowledge by means of a generous flow of information towards the universities, having in mind that *sharing knowledge means sharing development.*

Universities need updated knowledge to develop researchers, professors and future engineers, who will then be in the right place to make this transfer true. They must be in a condition to offer information of the highest quality, both in contents and in methods, to start up creativity and competitiveness in all the actors of this educational process.

Universities all over the world, as well as industry and services, are becoming aware that they are living in a new worldwide economic system, in which globalisation of the economy obliges all protagonists of progress to be willing to accept competitiveness as a basis to win markets for their products and services, based on their quality.

This implies an emphasis not only on the final quality of the product, but also on the quality of the entire productive process or that of the work of the people involved; a careful selection of the quality of the inputs; and establishing convenient controls at all stages. The consequence is to be able to offer *quality assurance.*

Industrial quality tries to sell merchandise that will not be returned, to clients that do return, thus ensuring the survival of that industry. Quality assurance in this case implies compliance with specifications that can be easily checked.

But educational quality is not so easily measured since professors *sell formation* (educational), and if it is not good, it cannot be returned. Offering quality means that it must be guaranteed. A system of educational quality cannot exist without the participation of professors and students, but undoubtedly the process starts in the maintenance and improvement of the professors' own formation, to produce professors that are capable of administering the talents of their students efficiently.

Then come the course contents, for which it is possible to define and select priority objectives, since there is a lot to be taught and the time for doing it is limited. Finally, come the teaching methods, which are not static, because they are permanently enriched by the contribution made by technology itself and by didactic research.

My friends: I am sure that we are all conscious of living in an ever increasingly interdependent world which will present many challenges to engineering, because it will offer opportunities to compete beyond national boundaries.

I believe that WFEO, on a world wide scale, such as FEANI in Europe, can lead a movement where all efforts will be concentrated on achieving internationalisation of engineering education and professional practice.

If we can reach this goal, equivalences in the international field will no longer be a Utopian idea and it will then be possible to develop peer based accreditation systems on a regional or national basis to assess attainment of the basic level of quality that can be reached through well organised national and regional accreditation systems.

Dear colleagues: I cannot conclude these introductory remarks without telling you that we, all the Members of the WFEO Committee on Education and Training, are proud because one of our most active members, Prof. Saad El-Raghy, in his position as Secretary General, has been appointed by the Egyptian Syndicate of Engineers to assume, together with Prof. Rasheed as Chairman, the important responsibility of organising this Third World Congress.

If we observe the enormous effort made to ensure the participation of so many people, coming from different parts of the world, we can be assured that this task has been shared with many Egyptian colleagues and it is fair that all of us present here transmit our thanks to them.

I trust that the results of this Third World Congress and its recommendations will contribute concrete initiatives to help educational institutions all over the world in their road towards excellence.

My friends: let us start working to make this belief true.

Cairo, Egypt, 14-17 November 1994

Prof. Miguel A. Yadarola

Chairman of the International Committee of the Congress

President of the WFEO Committee on Education and Training

AAEE EXECUTIVE DIRECTOR RECEIVES AN ORDER IN EGYPT



The photograph above shows (l-r): Prof. A. Nesterov, Prof. R. Jones and A/Prof. Z.J. Pudlowski at the Congress in Cairo, Egypt.

The AAEE 1st Vice-President & Executive Director, Associate Professor Zenon J. Pudlowski, Associate Dean (Engineering Education) and Director of the UNESCO Supported International Centre for Engineering Education (USICEE) in the Faculty of Engineering at Monash University was awarded the order of the Egyptian Syndicate of Engineers at the 3rd World Congress on Engineering Education and Training, held at Cairo between 14 and 18 November 1994. The Congress was organised jointly by the World Federation of Engineering Organisations (WFEO), UNESCO, the Egyptian Syndicate of Engineers, the Supreme Council of Universities in Egypt and Cairo University.

A/Prof. Pudlowski was one of only seven international figures who received the award. Others in the group were such eminent persons as Dr Adnan Badran, Deputy Director-General of UNESCO; Dr William Carroll, President of WFEO (USA); Prof. Miguel Yadarola, Chairman of the WFEO Education Committee (Argentina); Prof. Russel C. Jones, University Research Professor of University of Delaware (USA); Prof. Jack C. Levy of the British National Committee for International Engineering Affairs (UK) and Prof. Alexei Nesterov, General Director of the Russian

Association for Engineering Education (Russia). The order was for *contributions to the development of engineering education on both national and international levels*, the citation says.

At the Congress, A/Prof. Pudlowski presented an invited lecture entitled *Internationalisation of Engineering Education*, co-authored by Professor Peter LePoer Darvall, Deputy Vice-Chancellor of Monash University and Chairman of the Academic Advisory Committee of the USICEE. The lecture presented Monash's international involvement in engineering education, especially the idea and academic work of the USICEE.

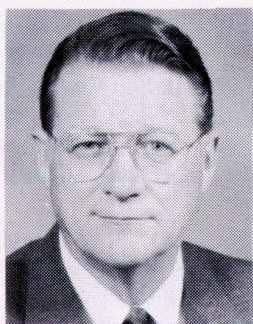
The USICEE is the world's first such centre, and was won by Monash last year, with the appropriate authority from UNESCO, in recognition of Australia's achievements in engineering education. The mission of the Centre is to transfer information on engineering education and industrial training from developed countries to less developed countries. It aims to become an expression of north-south and east-west dialogue, in which developed countries assist less developed countries under the sponsorship of UNESCO.

The role and importance of the USICEE has already received international recognition, so much so that the USICEE was mentioned twice in the Congress Final Report as the best example of internationalisation in engineering education. As a consequence, Australians were invited to assist Egyptian academics and engineers in setting up a regional sub-centre for engineering education, linked with the USICEE, at Cairo University. The Egyptian centre will serve the needs of the Arabic World and will operate in a network of centres currently being established by the USICEE in different regions of the world.

So great was the impact made on the Congress by a handful of Australians that the WFEO Education Committee invited the Institution of Engineers, Australia, to hold the *4th World Congress on Engineering Education and Training* in Australia in 1997.

The USICEE has just published its first Annual Report (1994). To increase the pool of supporters, the USICEE intends to open up its membership in 1995 to academic and industrial institutions, as well as to individuals in Australia and abroad. For a complimentary copy of the 1994 Annual Report and a membership form, please contact the USICEE Director, A/Prof. Pudlowski.

DELIVERING INTERACTIVE INSTRUCTION VIA SATELLITE TO ENGINEERS AND MANAGERS IN THE PACIFIC RIM



Background

NTU North American Service - The National Technological University is a private, non-profit, accredited institution founded in 1984 to serve the advanced educational needs of today's busy, highly mobile engineers, scientists and managers. NTU is governed by a Board of Trustees consisting primarily of industrial executives. NTU offers a wide range of courses via satellite taught by the top faculty of 46 leading engineering universities. Each participating university that delivers courses has or soon will have an earth station or uplink. NTU's functions during its first decade are to:

- Dr L.V. Baldwin*
 - * Award master's degrees in selected disciplines.
 - * Provide research seminars in each discipline.
- * Operate an instructional television network (ITV) via satellite for convenient, flexible, on-site service in North America.
- * Offer Advanced Technology & Management Programs (ATMP) in the form of non-credit short courses and workshops to introduce new advanced technology concepts to a broad range of technical professionals.
- * Operate a videotape instructional service in ATMP internationally.
- * Establish a sophisticated satellite network infrastructure between industry and the university community.

NTU began regular satellite delivery of advanced technical education in August, 1985. During the 1992-93 year of satellite networking, NTU offered 22,702 hours of academic credit instruction and 2,980 hours of state-of-the-art Advanced Technology & Management Programs. In a recent independent survey of educational networks operated worldwide via satellite, NTU was cited as providing 78 percent of all university instruction delivered by satellite in North America.

The North American network operates on AT&T TELSTAR 401, a state-of-the-art direct broadcast satellite launched on December 15, 1993. TELSTAR 401's footprint enables service in the continental US, Alaska, Hawaii, Mexico, Canada, and the Caribbean. NTU has a long-term lease on one Ku-band transponder which enables the delivery of up to 18 channels of compressed digital video (CDV). The current plan schedules 14 simultaneous channels of CDV during workdays. These signals are received by customers through 2.4 metre downlinks located near the participating professional's work location. NTU operates this wide band digital transmission system which was installed in 1992 with many special features. For example, each customer automatically is tuned to the program which they ordered. The customer receiver has four decoders which are under the control of the NTU network hub, and tied directly by software to the customer's order profile. In this way, ITV delivery is switched from the 14 channels operating simultaneously to match each customer's needs. Each uplink can send data files and FAX to the learner by satellite.

NTU's vision is to enable technical professionals and managers to share premier educational resources globally via telecommunications.

Many courses are broadcast in real time, so that NTU students can interact instantaneously with the instructor by telephone/fax. Many students, however, view the programs asynchronously, using videotapes of broadcasts, because this mode provides the needed flexibility for working adult learners. For these students, interaction with the instructor is by telephone during office hours, electronic mail via the NTU computer and INTERNET, and the regular flow of hard-copy assignments either by mail or, increasingly, by fax. The technologies are evolving very rapidly, and today the participants have more convenient, affordable options than when NTU was founded.

Today's candid classroom instructional television bears little resemblance to the chalk talks of two dozen years ago. New high-resolution colour cameras, fully remotely controlled, look down on an area on the instructor's desk. Not only can notes be shown, but also models, photographs and excerpts from books. Multimedia, the blending of computer-generated graphics with video and data, is in operation at several campuses that originate instruction over the NTU satellite network. Real-time programming, interactive displays of data files and computer-generated visuals can be blended with colour slide files, video and motion picture files. Miniature chemical wet-lab facilities have been installed in the ITV classroom of the University of Delaware. Students, both on campus and off, view presentations greatly enriched by clear views and dynamic illustrations. Today's generation of ITV instructional facilities provides unparalleled opportunities for creative instructors to interact with students. A new and sophisticated instructional facility of this type is now in use at the University of Missouri-Rolla patterned after the IBM state-of-the-art classrooms at Thornwood, NY.

The ITV signal is transmitted, as noted above, often synchronously with the campus instruction, by a satellite earth station or uplink operated by each university. In addition, each university has specially equipped ITV classrooms for credit courses, and many also operate full TV studios in the non-credit, short course production on the NTU network. Each invests in technical support staff. The ITV facilities at the universities are conservatively valued at US\$43 million, and at the industrial and government receive-only sites at US\$10 million.

This investment is, in fact, a bargain when you consider that today more one-third of all engineering and computer science faculty need only walk across the hallway to network with more than 300,000 practising engineers and managers at their job sites. Compare the cost and effectiveness of this model of resource sharing with traditional brick-and-mortar approaches and factor in the availability of expertise *when and where* needed, and networking is the clear choice. US universities seem to agree as the growth from 8 NTU member universities in 1984 to 46 today attests.

The 1994-95 NTU Bulletin lists 1,227 graduate-level courses approved and available over the network. NTU's academic programs lead to Master of Science degrees in the following areas:

chemical engineering
computer engineering
computer science
electrical engineering
engineering management
hazardous waste management

health physics
manufacturing systems engineering
materials science and engineering
management of technology
software engineering

plus a flexible, undesignated MSc for Special Majors. Most graduates take coursework from 6 to 8 different member universities to complete programs of study leading to an NTU MSc degree. On average, 2.7 years of part-time study is necessary to complete an NTU program of study leading to a Master of Science degree. To date, NTU has graduated 650 individuals.

Many are surprised to learn that the average NTU course enrolls only 10 students networkwide. The personal attention which one expects of a top graduate school is, therefore, available through NTU in a flexible, convenient way.

NTU is an expert teacher network. The majority of students in 59 per cent of all academic courses nominate their instructor for an outstanding teaching award. NTU can take no credit for creating these outstanding instructors. Rather, NTU *cherry picks* expert teachers with the active support of the member university administrators.

NTU academic instruction is closely tied to the adult learner's job needs. The majority of students in 89 per cent of the NTU courses state that the courses are relevant to their present job, and the majority in 97 per cent of NTU courses said that the courses were relevant to their career objectives.

Over the past nine years, NTU has developed a unique infrastructure which makes the telecommunications network effective. Each of the participating universities provides discipline experts to guide the eleven MSc curricula. Administrative officers and telecommunications network engineers from each university operate satellite uplinks in the shared NTU network and administer the outreach instruction. NTU's staff of 50 headquartered in Ft. Collins, Colorado, coordinates the interface with over 130 customer organisations. A multi-levelled advisory structure and quality monitoring system continuously improve service to the adult learners. NTU's growth and customer list attests to the vitality of the cooperative NTU link between universities, industry and government.

Continuing education has an equal role at NTU because of the institution's unique mission. This NTU non-credit service is called Advanced Technology & Management Programs (ATMP). ATMP presents top experts from industry, government, consulting firms, and academe in short courses, seminars and technology transfer tutorials. The entire program is customer driven and is not tied to regular on-campus instruction.

In 1993-94, NTU delivered more than 400 ATMP courses to over 100,000 participants. Many viewed these 100 per cent live, interactive teleconferences via the NTU CDV network. But an additional group at more than 50 overseas sites and non-NTU sites in North America viewed videotapes.

The average cost per course enrolment was US\$85; the average cost per student day was about US\$60. That is, the average course was 1.5 days or 7.5 hours of instruction.

NTU works with more than 70 producers of continuing education programs to formulate ATMP as a joint venture. The metaphor is to a diverse bookstore with the books of many publishers. NTU provides the delivery and marketing for the satellite *bookstore*, which enables many producers to create intellectual property of interest to NTU customers. Producers include technical societies (IEEE, ASME, SPIE, NSPE, and others), corporations (IBM, H-P, and others), specialised consultants, as well as both member and non-member universities (eg Software Engineering Institute at Carnegie-Mellon, MIT, Stanford and others).

Many educators believe that this unique ATMP service will grow more rapidly than credit revenue over the coming decade. NTU is essentially unique in this service area via satellite probably providing more than 90 per cent of all such service available to technical professionals and managers in the US market.

NTU Current International Sites

NTU began marketing ATMP to foreign sites of the US corporate-wide customers two years ago in anticipation of the opportunity to develop satellite linkages. Standard agreements were signed with the local management of each site. Local site education coordinators are assigned to work with NTU. The US headquarters staff provide an introduction to NTU services to assist this effort. It should be mentioned that 35 sites are in the Pacific Rim area served by PanAmSat 2. These sites of seven customers are in 11 countries: Australia, China, Hong Kong, India, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand. Most of these locations are manufacturing and product development facilities.

NTU markets ATMP videotapes with notes to each of the international sites. No academic credit offerings are made available because of the long lag time and unreliability that would be associated with videotape shipment.

Based on recent international customer inputs, NTU totally redesigned and simplified the pricing structure. NTSC, PAL and SECAM videotapes are now offered as an option with no additional charge. An international marketing manager has been assigned at NTU headquarters to guide this new marketing effort which began in December, 1993.

The current list of Pacific Rim sites could be expanded quickly by adding major sales and service locations of IBM, Motorola, NCR and others. The NTU ATMP service to help support corporate training would be the primary market.

In addition, NTU academic credit services will be marketed to the Pacific Rim when the new satellite telecommunications network is operational in late 1994 as discussed below.

Delivery to Pacific Rim

NTU has negotiated for a CDV channel, and an option for future channel additions as needed, with the PanAmSat Global Satellite System. PAS-2 went into service at 191 degrees WL in September, 1994, after a successful launch on July 8, 1994. This new Hughes HS-601 is optimised for digital traffic and has a 15-year design life.

NTU will operate a CDV channel on one of the 60 Watt C-band transponders. The operational plan calls for NTU to install a receiver and decoder at the PanAmSat Teleport in California. Courses scheduled for the Pacific Rim will be switched from NTU Headquarters in Ft. Collins, but could originate from any of the 40 uplinks in the US which currently feed the NTU North American network. Thus, late afternoon and evening classes can be delivered live and daytime classes delivered at the time taught in the US for overnight viewing the next day in the Pacific Rim.

NTU technical staff has over three years experience in operating a CDV network similar to that outlined here.

The NTU service to the Pacific Rim will be received on 3.7 meter C-band antennas. The cost of a TVRO with decoder is estimated to be less than US\$5,000. Service reliability is projected to be comparable to current US experience of NTU.

In the December, 1994 through February, 1995, time period, NTU will broadcast, free of charge, the two non-credit ATMP programs, one live and one tape delayed, to better fit the Pacific Rim time-frame. There will be 9 to 12 hours each weekday for a sample of our current for-credit programs. But on Tuesdays and Thursdays, NTU will reserve three hours

for occasional live telecasts with those involved in the demonstration to answer questions and to discuss how we can improve collaboration. NTU will tape the 24 hours of broadcasts each Friday and transmit that from the US on Sunday so that the Pacific Rim will receive the programs on Monday. Therefore, each weekday, the Pacific Rim channel will have 24 hours of service and a broad sampling of NTU's offerings.

For more information concerning how your organisation can gain experience through these telecasts, please contact Lionel Baldwin at NTU (Telephone: +1 303 495-6411; Fax: +1 303 484-0668; e-mail: Baldwin@NTUPUB.NTU.EDU).

NTU by its very nature is an alliance of stakeholders with a vision to share premier educational resources globally via telecommunications. Therefore, NTU Pacific Rim would welcome alliances with universities in the area. The satellite channel can be shared, as it is in North America. Local uplinks could become origination locations for instruction throughout the Pacific Rim. In the long term, two-way exchanges between the Pacific Rim and North America will be encouraged.

The typical cost of an individual registration in academic courses leading to an MSc degree is US\$530/credit or US\$1590/course, which is about US\$17,500 per graduate. There is no lost time from the job, nor travel costs, however, while students study with leading US advanced engineering and management faculty in classes that average only 10 students per NTU course for the entire network. Graduate education of the highest calibre is, therefore, affordable for high potential contributors in any organisation.

Typical cost for an individual participating in a one-day, non-credit seminar or training session is about US\$100, though prices vary with topic and producer. This includes the telecast and supporting print material which will be transferred electronically for local reproduction. There are no annual fees. Organisations pay in accord with their usage.

Build on a decade of experience and growth which NTU has in North America, by joining the select group which will oversee the development of NTU's Pacific Rim network and services.

Dr Lionel V. Baldwin
President
National Technological University
Fort Collins, Colorado, USA

FORTHCOMING CONFERENCES ON ENGINEERING EDUCATION

Taiwan, Taipei, 17-19 April 1995 - International Conference on Skill Formation (ICSF'95). Organised by: the National Taiwan Normal University (NTNU). Contact person: Jon-Chao Hong, NTNU, Tel: 886 2 3924058, Fax: 886 2 3629670, e-mail: ntnuto33@twnmoe10

Russia, Moscow, 23-25 May 1995 - International Conference on Engineering Education (ICEE'95). Organised by: the Russian Association for Engineering Education (RAEE), Contact person: Prof. M.R. Liberzon, Tel: +7 095 2002727, Fax: +7 095 2006764, e-mail: alirm@asdi.msk.su

Poland, Cracow, 29-31 May 1995 - 2nd Advanced Training Course: Mixed Design of VLSI Circuits - Education of Computer-Aided Design of Modern VLSI Circuits. Organised by: the Technical University of Lodz, Poland (TUL). Contact person: Dr Marek Turowski, Tel: +48 42 312620, Fax: +48 42 362238, e-mail: mturowski@lodz1.p.lodz.pl

Poland, Zakopane, 5-9 June 1995 - 5th Symposium on Microcomputers in Education (μ CE-5). Organised by: Warsaw University of Technology (WUT), Warsaw, Poland. Contact person: Dr Andrzej J. Marusak, Tel: +48 2 6280665, Fax: +48 2 6256633, e-mail: regi@plwatu21.bitnet

Australia, Melbourne, 3-6 July 1995 - 1995 International Congress of Engineering Deans and Industry Leaders. Organised by: Monash University, Clayton, Melbourne, Australia. Contact person: A/Prof. Zenon J. Pudlowski, Tel: +61 3 9054977, Fax: +61 3 9051547, e-mail: ZJP@eng.monash.edu.au

Turkey, Istanbul, 14-16 August 1995 - International Conference on Recent Advances in Mechatronics (ICRAM'95) (including a session on education). Organised by: Bogazici University, Istanbul, Turkey. Contact person: Prof. Okyay Kaynak, Tel/Fax: +90 212 2872475, e-mail: kaynak@boun.edu.tr

Slovakia, Bratislava, 13-15 September 1995 - 3rd International Conference on Computer-Aided Engineering Education (CAEE'95). Organised by: the Slovak Technical University, Bratislava, Slovakia. Contact person: Prof. Daniel Donoval, Tel: +42 7 723486, Fax: +42 7 723480, e-mail: caee95@elf.stuba.sk

Greece, Thessaloniki, 25-27 September 1995 - International Symposium on Electromagnetic Fields in Electrical Engineering (ISEF'95) (including a session on education). Organised by: the Technical University of Lodz (TUL), Lodz, Poland. Contact person: Prof. Slawomir Wiak, Tel: +48 42 312571, Fax: +48 42 362309, e-mail: wiakslaw@lodz1.p.lodz.pl

USA, Minneapolis/St. Paul, 15-20 October 1995 - 4th World Conference on Engineering Education. Organised by: the Technology-Based Engineering Education Consortium (TBEEC), William C. Norris Institute, Bloomington, Minnesota, USA. Contact person: Dr E. Rex Krueger, Tel: +1 612 8530225, Fax: +1 612 8530287, e-mail: wcnrex@epx.cis.umn.edu

WFEO WORLD CONGRESS ON ENGINEERING EDUCATION AND TRAINING, CAIRO, EGYPT

The *3rd World Congress on Engineering Education and Training* under the theme *Quality of Engineering Education - An International Perspective* was held in Cairo, Egypt, between 14 and 18 November 1994. The Congress was organised by staff members of the Faculty of Engineering at Cairo University in conjunction with the Egyptian Syndicate of Engineers and the World Federation of Engineering Organisations (WFEO). The principal sponsors included the Supreme Council of Universities in Egypt (SCUE) and UNESCO, with over 20 other cooperating organisations, including our Association.

The International Congress Committee comprising close to 20 persons was led by the Chairman of the WFEO Education Committee, Professor Miguel A. Yadarola of Argentina. At the Congress Opening Ceremony, Prof. Yadarola presented an excellent opening address which is included in this issue. The Congress program and all the local arrangements were prepared by the Technical & Organising Committee under the chairmanship of Professor Saad M. El-Raghy of Cairo University.

The Congress attracted over 500 participants, including about 120 attendees from abroad. Over 130 papers were presented at the Congress and were included in the *Congress Proceedings*. Recent research and developmental achievements in engineering education and industrial training were presented by academics and industry representatives. The Congress discussions provided the overseas visitors with tremendous insight information on the needs and requirements of a number of less developed countries in the Arabic region and the world beyond. The well-known Egyptian hospitality was experienced not only during Congress formal functions but also during individual contacts.

Members of the Congress Executive, including those on the International Committee, had the pleasure of meeting the Minister of Education, H.E. Prof. H.K. Bahaa El-Din, in his office one evening. In a charming atmosphere, the Minister presented the status of Egyptian education and the work of his Ministry. He spoke enthusiastically about the level of moral and financial support that his portfolio received over the last two years from the Egyptian Government. The Government sees education as a major capital investment and has increased

the budget of the Ministry of Education by a factor of five. Egypt is currently building many schools around the country in order to improve human resources development at all levels.

Our offer to assist Egypt in engineering and technology education in general, and in human resource development for technical industry in particular, was very well received. It is envisaged that a regional sub-centre for engineering education, linked with our USICEE, will be established in one of the academic institutions in the near future, with the support of the Egyptian Syndicate of Engineers. The Minister also has promised his assistance in this venture. With such support we believe that the sub-centre will develop relatively quickly.



The picture above which was taken during the Opening Ceremony of the 3rd World Congress on Engineering Education and Training under the theme Quality of Engineering Education - An International Perspective shows the Congress Executive. Seated are (l-r) Dr S. A. Kareem, Vice-President of the Egyptian Syndicate of Engineers (partly obscured); Dr W. Carroll, President of WFEO; Prof. M. El-Hashimy, Representative of the Minister of Education; Dr A. Badran, Deputy Director-General of UNESCO; Prof. M. Yadarola, Chairman of the WFEO Education Committee; Prof. S. M. El-Raghy, Chairman of the Congress Organising Committee.

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

Associate Professor Zenon J. Pudlowski, Faculty of Engineering, Monash University, Wellington Road, Clayton, Melbourne, VIC 3168, Australia, Telephone: +61 3 905-4977, Fax: +61 3 905-1547, e-mail: ZJP@eng.monash.edu.au

Association members and academic 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.