USICEE’S International Cooperation Initiatives and Programs in Engineering Education

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The UNESCO Supported International Centre for Engineering Education (USICEE) was established in the Faculty of Engineering at Monash University on the recommendation of the UNESCO Steering Committee on Technical Human Resource Development under the chairmanship of Dr. Adnan Badran, Deputy Director-General of UNESCO. The USICEE is the world’s first and only centre for engineering education established under the auspices of UNESCO. It is a unique development which has been endorsed by a number of academic institutions and professional organisations worldwide. The establishment of the USICEE is regarded as the most important undertaking in the internationalisation of engineering education. Clearly the needs and opportunities to break down cross-cultural barriers, in this case in engineering education, are great, thereby promoting international trade, goodwill, peace and development. The establishment of the USICEE is our response to this call.

Mission

The general mission of the USICEE is to facilitate the transfer of information, expertise and research on engineering education, and in particular to act as a clearinghouse for the transfer of information on textbooks, engineering teaching courseware, software, teaching methodologies and equipment utilised in engineering education from developed to less developed countries.

Objectives

The USICEE endeavors to provide the necessary resources for a wide range of activities including research into the effective use of equipment, courseware and software, as well as effective methodology utilised in engineering education. The major objectives of the Centre are to:

- Conduct research into the methodology of the teaching and learning processes and assess the effectiveness of teaching programs designed for developing technologies.
- Carry out research on equipment, textbooks, courseware and software utilised in engineering education and encourage further research in these areas.
- Collect information on advances in engineering education and develop modern techniques for the dissemination of this knowledge.
- Promote collaboration in the field of engineering education between institutions in developed and developing countries.
- Provide short courses and seminars on engineering education for academic staff, industrial management and community leaders and organise conferences on the advancement of engineering education for human resource development.
- Lobby the world’s engineering community, engineering associations, industry organisations and governments for support of new trends and understanding of the need for engineering education.
UNESCO Sponsored Training Course

Work was carried out on a comprehensive course teaching manual for academic teachers on The Application of Computer-Assisted Training Programs in Engineering Education. The manual was published in book form in January 1996. Several academics from various Monash University departments prepared methodological units for this UNESCO sponsored course. For the first time the course was given to 12 young academics from South-East Asia and the Pacific in November 1994. Results of a survey of the academic outcomes of the course were extremely useful in improving the course material. Many academic institutions worldwide have already expressed their interest in running this course in their institutions in collaboration with the USICEE. Also, the USICEE will encourage the former trainees to organise and conduct this course in their home countries.

An International Co-operation Network

The Centre has already established contacts with academic institutions and individual academics in over 34 countries in all corners of the world, with particular emphasis so far on the Asia-Pacific region and Central and Eastern Europe. A comprehensive database is currently being built, consisting of academics and industry leaders particularly interested in engineering education.

Eleven co-operative agreements have been signed between the USICEE and other academic organisations worldwide to establish collaboration on academic and research related activities. The scope of such collaboration is to cover a broad range of engineering education research and development activities. The envisaged activities are:

- Training programs, including degree and non-degree programs.
- Research collaboration in areas of mutual interest to both parties - particularly with software development for engineering education.
- Exchange of academic materials which are made available to both organisations; other sources such as computer-based and printed materials, when available, to be included in the exchange.
- Exchange of scholars in the course of academic development.
- Sponsorship of co-operative seminars, workshops and other meetings on matters of mutual interest.
- Establishment of a number of regional sub-centres for engineering education, linked with the USICEE.

The USICEE has hosted a number of local and overseas academics in 1995. Visitors were briefed on the role, status and academic activities of the Centre. The visitors represented academic institutions in such countries as Thailand, Indonesia, India, Denmark, France, Turkey, Egypt, Poland, Russia and others. Altogether, over forty Australian and international academic and industry visitors have spent some time at the Centre in 1995.

Transfer of Information on Engineering Education

The USICEE has received two grants under the Australian Program of Training for Eurasia (APTEA) to assist academic institutions in eleven Central and Eastern European countries in engineering education. The objective of the projects is to transfer information on engineering education from Australia, thereby assisting academics at technical universities in their endeavour to restructure and improve their university engineering education. The designated countries are: Albania, Bulgaria, Estonia, Hungary, Latvia, Lithuania, Romania, Macedonia, Poland, the Czech Republic and Slovakia. These projects will assist them in their contribution to the development of market based economies through the acquisition of specialist skills developed in Australia. Another objective of these projects is to improve and promote academic and business contacts between Australia and those countries. In 1995 work was carried out on establishing contacts and collecting data.
Subsequently, seventy libraries within academic institutions in these countries, were sent publications and literature relating to engineering education.

**Professional Societies within the USICEE**

The USICEE is involved in numerous national and international activities. These include the support provided to two professional organisations: the USICEE hosts the Headquarters of the Australasian Association for Engineering Education (AAEE) and the Secretariat of the International Liaison Group for Engineering Education (ILG-EE).

**The AAEE**

The Australasian Association for Engineering Education (AAEE) is dedicated to the enhancement of engineering education and industrial training, and is a leading engineering education association in our part of the world. The AAEE is a society within the Institution of Engineers, Australia (IEAust.) and a group within the Institution of Professional Engineers, New Zealand (IPENZ). The Centre provides intellectual and administrative services to the AAEE. In conjunction with the Centre, the AAEE produces two magazines and a number of other publications. The regular publications are:

- **AAEE Newsletter**: 4 issues/year.
- **Australasian Journal of Engineering Education (AJEE)**: nominally 2 issues/year.

It should be mentioned that the AJEE has been the world’s first and only journal on engineering education fully available via the Internet. The address of the electronic version of the journal on the WWW is: [http://elecpress.lib.monash.edu.au/ajee/](http://elecpress.lib.monash.edu.au/ajee/)

The Association organises annual conferences and co-sponsors other local and international conferences and meetings. Seven extremely successful conferences have been organised since its inception. The conferences were hosted and organised by key engineering education institutions in Australasia. Close to 140 academics, government, industry representatives and postgraduate students attended the last conference organised by the USICEE in collaboration with The University of Melbourne in December. Over 110 presentations were made and 100 papers were included in the Conference Proceedings, published by the Centre.

The Association co-sponsored the 3rd World Conference on Engineering Education, which was held at the University of Portsmouth, UK, in September 1992, co-sponsored the 2nd East-West Congress on Engineering Education, which was held at the Technical University of Lodz, Poland and most recently was a major co-sponsor of the 4th World Conference on Engineering Education organised by the Technology-Based Engineering Education Consortium at Minneapolis/St Paul, Minnesota, USA, in October 1995.

**The ILG-EE**

The International Liaison Group for Engineering Education (ILG-EE) is an independent working group, promoting international activities in the field of engineering education. The Group was established in 1989. It consists of over fifty outstanding international figures actively involved in engineering education and industrial training. It is registered as a charity organisation in the United Kingdom. The main objectives of the ILG-EE are to:

- Promote the exchange of information and facilitate scientific co-operation amongst national institutions and programs of common interest.
- Propose and co-ordinate the organisation of meetings in the field, in particular international conferences and workshops.
- Identify problems of practical interest and stimulate co-ordination of research and development efforts.
- Assist members and sponsoring organisations in carrying out activities relevant to their programs.
- Serve as a means of disseminating information on progress to members and member countries and other organisations.

The ILG-EE has sponsored and organised three World Conferences on Engineering Education (Sydney 1989, Portsmouth 1992 and the 4th World Conference in Minneapolis/St Paul, Minnesota, USA, in October 1995. The ILG-EE also co-sponsors many other international conferences and meetings, apart from the World Conference series.

UNESCO--UNITWIN Network

UNITWIN is a program facilitated and supported by UNESCO to promote twinning and networking among universities. The Australian Vice-Chancellor’s Committee (AVCC) has initiated the process of establishing the UNESCO-UNITWIN multilateral network of higher education institutions in the Asia-Pacific region. An Asia-Pacific Higher Education Network (APHEN) has been established with eight priority areas identified. The USICEE has been invited by the AVCC to establish an Asia-Pacific UNITWIN sub-network for engineering education to strengthen the exchange and transfer of information on new developments in this field.

An APHEN-EE (APHEN - Engineering Education) sub-network has been created within the USICEE with over 100 local and overseas contacts. An electronic mailing list called APHEN-EE has been set up to facilitate communication between members of the sub-network. The main objectives of the USICEE acting as the APHEN-EE sub-network for engineering and engineering education are to:

- Establish and maintain a database of engineering schools in academic institutions and of individual academics particularly interested in engineering education.
- Set up an electronic means of communication.
- Facilitate the contacts between member institutions of the sub-network.
- Collect and transfer information on research and developmental activities in engineering education.
- Facilitate the exchange of staff and students between partner institutions.
- Carry out joint research and development projects on engineering education.
- Organise courses, meetings, symposia and conferences on topics relevant to the activities of the UNITWIN sub-network.
- Publish and distribute material relevant to the activities of the APHEN sub-network.

With the establishment of the APHEN-EE network, it was essential to create a forum for engineering educators to discuss issues of innovation in engineering and technological education, not only by electronic means, but also in person. Therefore, the 1st Asia-Pacific Forum on Engineering and Technology Education will be organised by USICEE in July 1997 at Monash University. It is envisaged that the forum will generate an action oriented agenda for the APHEN-EE network to develop engineering education and to strengthen the collaboration and exchange of information between countries of the Asia Pacific region. It is anticipated that other regional organisations promoting engineering education will be involved in this enterprise.

Communications

The USICEE places particular emphasis on the dissemination of information concerning its activities. In 1995 the USICEE published a large number of hard publications, including books, proceedings, journals, brochures, etc, which were subsequently distributed throughout the world. Electronic communication using the Internet is...
a new, and extremely powerful medium. Several new initiatives, involving the use of the electronic medium were instigated in 1995.

The USICEE has established its own Newsletter which is widely distributed within the Faculty, to those on the relevant databases and to visitors to the Centre. Two issues of the USICEE Newsletter were published and circulated in March and October, not only in hard copy but also electronically via the Internet.

To facilitate the transfer of information throughout the national and international engineering education communities, the USICEE has established several electronic mailing lists. Other mailing lists for the interest groups are envisaged to be set up in the near future. Access to the mailing list is free to international academics. Also, the Centre's activities can be accessed on the Internet using any of the World Wide Web browsers (such as Netscape or Mosaic) at: http://civil-www.eng.monash.edu.au/usicee/usicee.htm

USICEE's Involvement in Conferences and Meetings

The USICEE is actively promoting and supporting the organisation of various national and international conferences and meetings. The paramount objective of this activity is to raise the national and international profile of the USICEE as an organisation fully committed to the progress of engineering education.

The 1995 International Congress of Engineering Deans and Industry Leaders was organised and hosted by the USICEE at Monash University between 3 and 6 July 1995. The Congress was the fourth in an international series and the first held in Australia. The Congress was well attended by close to 200 senior academics and industry leaders from 35 countries, representing five continents. Over 120 papers were presented and included in the Congress Proceedings.

The prime aims of the Congress were to provide an international forum for continued dialogue on adapting engineering education and research to the needs of national and international economies and cultures, and the development of international collaboration in this area, as well as encouraging and stimulating academia/industry collaboration, with particular emphasis on less developed countries and countries evolving towards a market economy.

The Centre was also invited to co-sponsor the 2nd Advanced Training Course: Mixed Design of VLSI Circuits - Education of Computer-Aided Design of Modern VLSI Circuits, held in Cracow, Poland, between 29-31 May 1995. The USICEE Director was invited to present a keynote lecture at the Course on curriculum development in electrical and electronic engineering.

The 3rd East-West Congress on Engineering Education under the theme Re-vitalizing Academia/Industry Links is being presently organised by the USICEE in Gdynia, Poland. The Congress will be held at the Gdynia Maritime Academy from 16-20 September 1996 with other national and international organisations as co-sponsors. This Congress is a follow-up to the extremely successful 1st and 2nd East-West Congresses on Engineering Education held in Cracow, Poland in 1991 and in Lodz, Poland in 1993, and it is hoped that the Congress will raise the profile of engineering education worldwide. The theme Re-vitalizing Academia/Industry Links has been chosen to emphasise the importance of systematic and comprehensive collaboration between the two parties in engineering education and industrial training. The emerging new industry of a market driven economy in a post-centralised system has a special role to play in the process of modernisation of education institutions. Also, the 8th Annual Convention and Conference of the AAEE is being organised by the USICEE in conjunction with the Faculty of Engineering at The University of New South Wales (Sydney). The conference, under the theme Keeping Pace with Social and Technical Change will be held at The University of NSW between 15 and 18 December 1996.
The world has become a global community which now provides more opportunity for collaboration. The increased level of internationalisation of engineering education worldwide has placed Australian academic institutions in a new, and challenging situation as they endeavour to prepare their graduates for an international arena.

Global Congress in 1998

Another achievement for Monash is that the USICEE has been appointed by the ILG-EE at the recent World Conference in St Paul, as the organiser of the 5th World Conference on Engineering Education, to be held in Cracow, Poland, in September 1998.

It is envisaged that the 5th World Conference will be a part of a large Global Congress on Engineering Education organised and coordinated by Australians in Central Europe. The Global Congress will also incorporate the 4th East-West Congress on Engineering Education and a 1998 Congress of Engineering Deans and Industry Leaders. This activity will be co-sponsored by the UNESCO Steering Committee on Technical Human Resources Development. A number of regional conferences on engineering education, preceding the Global Congress, is being instigated by the USICEE, and will be held in 1997. The objective of this series is to raise the profile of engineering education in such regions as Africa, Central and South America, the Arab world, Asia-Pacific, and the countries of the former Soviet Union, and to prepare the stage for the Global Congress.

Conclusions

The operations of the USICEE are an expression of the external focus of Australian engineering education, and in particular of Monash University and its sense of purpose as Australia’s International University. Internationalisation of engineering education is certainly an idea whose time has come, and in pursuing this idea we both benefit our own students and enhance engineering education worldwide.

The Centre acts as a focus for engineering education in Australia, being the secretariat for the Australasian Association for Engineering Education (AAEE) and for the International Liaison Group for Engineering Education (ILGEE). The USICEE is determined to work in cooperation with other Australian and international engineering schools and academics. The USICEE is a unique development in the world, and as such has placed Monash University in a very privileged position on the world’s map of engineering education. This has been done through the dedication of its staff and associates and with extremely limited funds.

References

Biographies

Zenon J. Pudlowski is presently an Associate Professor, Associate Dean (Engineering Education) and Director of the USICEE. He has been instrumental in establishing an International Faculty of Engineering at the Technical University of Lodz, Poland, of which he is the Foundation Dean and Professor (in absentia). He also has been appointed Honorary Dean of the English Engineering Faculty at the Donetsk State Technical University in Ukraine. Prof. Pudlowski is the Foundation 1st Vice-President and Executive Director of the Australasian Association for Engineering Education (AAEE) and the Editor-in-Chief of the Australasian Journal of Engineering Education. He is the Foundation Secretary of the International Liaison Group for Engineering Education. He is a member of the UNESCO Steering Committee on Technical Human Resources Development.

Peter LeP. Darvall has been Professor and Dean of Engineering at Monash University from 1988 to 1994, and he is presently Deputy Vice-Chancellor. He graduated in Engineering at Melbourne University in 1963 and gained higher degrees at Ohio State University and Princeton University and a DipEd at Monash. He has held visiting appointments at UNAM in Mexico, the University of California at Berkeley and the University of Wisconsin. Professor Darvall is presently the Immediate Past President of the Australasian Association of Engineering Education, and was elected Chairman of the International Liaison Group for Engineering Education at the recent 4th World Conference on Engineering Education, held at Minneapolis/St. Paul in the USA. Prof. Darvall is Chairman of the USICEE.