

The World Conference on Engineering Education Portsmouth, September 1992

THE THIRD World Conference on Engineering Education took place in Portsmouth, UK, 20-25 September 1992. It followed earlier conferences held in Cologne, Germany (1984) and Sydney, Australia (1989).

The conference attracted 420 participants and over 250 papers, now published in three volumes with a total of 1800 pages. Nine keynote addresses were also given during the conference.

With such a high acceptance rate it is difficult to gain a proper insight into the contents of the material presented. The amount of useful information that could be given in each paper was severely limited by the restriction on length (a maximum of six pages per paper). This tended to encourage superficial treatment of topics and gave little opportunity for detailed description of some interesting new developments and difficulties encountered in their practical implementation. There were, however, some very interesting presentations which deserve attention.

KEYNOTE ADDRESSES

Of the keynote addresses, by far the most informative was that by Professor Ohashi, the President of the Japan Society of Mechanical Engineers and former Professor of Mechanical Engineering at the University of Tokyo's Faculty of Engineering. He made a comparison between engineering education at the undergraduate level in the USA and Japan, and provided considerable insight into the industrial philosophy of each country towards education. Two of the issues he examined deserve further attention.

Firstly, Japanese employers regard new graduates as a 'raw material which has to be wrought and shaped' before they can contribute effectively in employment. US employers, on the other hand, consider them as 'finished products' which can be 'used' immediately on the job. These attitudes may be the two extremes, since few countries can fully take up the Japanese approach, but it is unrealistic to expect graduates to be able to make an immediate contribution if they are to do so effectively in the longer term.

Secondly, the entry requirements for Japanese universities, especially the top ones, are extremely high, but the result is that successful applicants do not have to work very hard in order to gain a

degree. In the USA, on the other hand, university entrance is fairly easy but accepted students have to work much harder in order to obtain their degrees.

These are very important points to note and, since he also studied in Germany, perhaps Professor Ohashi could be persuaded at a future date to compare the Japanese system with that of Germany or of Europe as a whole.

INTERNATIONAL ISSUES

Forty-eight papers addressed these issues. Contributions came from places as far apart as China, Malaysia, the Philippines, Finland, North America and Latin America. The issues covered included engineering education in the developing countries, languages for engineers, mobility between the countries of the European Community, and international collaboration for technology transfer.

The majority of the papers were interesting in themselves but they provided little information about awareness of the potential of the methods described in an international context. What is perhaps clear is that nearly all governments or their agencies are addressing common issues in engineering education. These can be grouped under the following headings:

- How to increase the number of engineering students with appropriate qualifications in educational establishments.
- How to improve the quality of the educational systems.
- How to ensure that graduates can contribute increasingly to the nation's competitiveness.

QUALITY ASPECTS

Twenty-six papers were presented under this heading. They shared a common theme but the solutions they proposed vary considerably. In one form or another most of the papers suggested that the quality of teaching requires attention. What is actually 'wrong' has been attributed to, for example, features such as the following:

- The extensive use of lectures for information transfer.
- Too much numerical work.
- Teachers' lack of communication skills and creativity.
- Too much information to be acquired.

Typical solutions proposed include:

- Making changes in existing course content.
- Developing students' ability to understand and applying modelling skills.
- Learning from the experience of medical education.
- Inculcating communication and co-operation skills.
- Improving interaction between technology and the needs and values of society.
- Changing the learning culture.

It is disappointing to note that there is still a strong belief that all the ills of engineering education can be overcome by dealing with only one or two factors. In fact, the need is first to define the educational goals clearly and then to seek solutions that will fulfil these requirements—and this is particularly true with respect to quality.

COURSES AND TEACHING ISSUES

By far the largest set of papers, 68, came in the section on 'Courses and Teaching Issues'. The majority of these papers were devoted to lessons gained from personal experience. Key issues appeared to embrace the following:

- Modularization of degree courses.
- Designing courses for a particular discipline.
- Difficulties associated with teaching and learning fundamental principles in engineering.
- Systems engineering and system thinking.
- Using laboratories for self-instructional learning.
- Attaining competency in specific subjects such as design.
- Hand-out course material.
- Developing problem-solving and group-work skills.

With the wealth of valuable experience available here engineering academics need to devise methods for efficiently transferring these lessons into their own fields.

ACADEMIC-INDUSTRIAL LINKS DOCUMENT

Since many of those undertaking engineering education are aiming to take up careers in industry, it was good to find a section of the Proceedings entitled 'Academic-Industrial Links', and even more gratifying to note that it contains 54 papers. Unfortunately, closer examination revealed that the majority of the papers are not directly concerned with this particular subject! There was, however, a series of informative papers on technology transfer. Factors dealt with include the following:

- Recognition of the advantages of good links but also of the problems existing over implementation.

- The difficulty of making students understand technology transfer when engineering faculty members themselves do not understand how it operates in their own university. In particular, there is a conflict between the desires for financial reward and publication for promotion purposes.
- The key lesson of technology transfer experience gained by the University of Waterloo's Centre for Process Development is that this task requires both resources and time, but success depends on the presence of a 'market-pull' at the very early stage of a project.
- A challenge to the popular 'idea that technology transfer between academic establishments and industry is a valid and viable model for the process by which engineering knowledge grows and by which engineering progresses.
- Problems associated with balancing academic excellence, involvement in technology transfer and the need to generate funds from external sources for further work.

This section also includes an industrial view from Balfour Beatty Ltd. This is one of the very few contributions from a representative of industry and covers training placements, student sponsorship, research and development projects and external involvements, and it deserves careful study.

THE CONFERENCE ITSELF

The University of Portsmouth must be congratulated on attracting such a good number of participants and the Conference Chairman, Terry Duggan, certainly put in considerable effort—not to mention his persuasive skills and single-mindedness—into ensuring that the conference would be held in Portsmouth. The organisers also did well to keep the cost of the conference at a reasonable level. There were, however, some disappointing features.

Firstly, there were very few participants from the industries that are the major employers of engineering graduates. Of the few who did attend, a significant number were invited speakers.

Secondly, the entire programme of the conference consisted of presentations of papers, and there often appeared to be little 'link' between those, even in a given section.

Thirdly, the multi-location arrangements for both conference venue and delegate accommodation limited the opportunities for participants to meet and get to know each other.

Lastly, the quality of delivery varied widely. Some speakers had excellent visual materials in their presentations. Others still appear to believe that a viewgraph of a closely typed page of text can be read—let alone absorbed—by the audience!

C. KUO
is Associate Editor