

Structural engineering education in the 21st century: the way forward

Dr Graham Owens (F) Past President, reflects on the challenges ahead

Introduction

During my Presidential year, I devoted considerable attention to the formation of future generations of structural engineers: visiting universities, addressing students formally and talking informally with both students and academics. We have much to be grateful for; there are many talented and enthusiastic undergraduates. We also have dedicated academics with a real interest in structural design. However, it is noteworthy that the median age for this group is over 50 and rising.

I have also talked to practising engineers about many of the pressures in their professional lives, including graduate intake. While they welcome the enthusiasm and basic talent of today's graduates, concern has been expressed about a reduced level of understanding of structural behaviour. These are not just the perceptions of an older generation surveying a time of significant change. A Graduate School of a leading international practice has charted a substantial reduction in understanding of structural behaviour from the 1970s to the present day. At worst, when tested on a qualitative understanding of structural behaviour, many students with good degrees from universities with strong reputation score zero!

Quite separately from these legitimate and serious concerns about graduate understanding of the fundamentals of our applied science, I have also realised that, with some notable exceptions, the Institution does not have a very close relationship with many of its academic communities. We have made excellent progress in establishing Student Liaison Officers in many universities throughout the world. However, in my view, these appointments should be starting points for much closer relationship, to mutual benefit.

It was these two themes that encouraged me to initiate an Annual Academics' Conference, to be held each year in September, each conference having its own theme. For this inaugural conference it was simply 'Structural Engineering Education in the 21st Century'.

The 2009 Conference

This took place on 21 September at HQ, attended by approximately 40 academics and around a dozen practitioners. In the morning, we had the following formal presentations:

- 'A practitioner's view of current graduate competence' John Nolan
- 'Understanding structural modelling' Dr David Brohn
- 'Educating structural engineers for 21st century' Dr M Cook
- 'Teaching practice and outcomes a JBM and personal view' Prof Gerry Parke
- 'Teaching of structural engineering – fundamental issues' Prof Ian MacLeod
- 'The teaching of structural analysis' Prof Ian May.

These attracted very lively discussion, both before lunch and in two sets of break out sessions in the afternoon. The day concluded with a plenary session to draw some conclusions from a fascinating day's proceedings. Full versions of all the presentations and notes from the break out sessions may be viewed at (www.istructe.org/educationaltrust). They make

fascinating and thought-provoking reading. I commend them to all those who take an interest in our tertiary education or have a role in the recruitment and training of graduates.

Specific actions for the Education Panel

In the final plenary session, the following actions were identified for the Institution to undertake as it starts to provide more leadership in this very important sector of its activities:

- 1) To clarify industry requirements and expectations. Revised guidance should be provided on what the profession is looking for and what 'good output' looks like.
- 2) Through the JBM, review the current curriculum and syllabi and clarify core requirements of engineering courses and learning outcomes, e.g. understanding of structural behaviour.
- 3) Provide a facility of sharing best practice on teaching, e.g. through the Academics Conference and the web. This should go beyond current practice of a very brief note to the JBM report.
- 4) Encourage greater engagement between universities and local branches / divisions. This should support academics in gaining professional membership but should also increase opportunity for greater industrial involvement.
- 5) Work with the Royal Academy of Engineering to promote secondments to industry.
- 6) Review existing resources and develop material that corrects current deficiencies, e.g. text books case studies and teaching aids.
- 7) Work with and through the ETB, E4E, and the Royal Academy to influence on priorities in schools curricula and university funding.
- 8) Work with the above bodies and others to encourage greater outreach to schools.

These actions will be undertaken by the Education Panel, under the able chairmanship of Dr Mike Cook. Progress on the above is to be reported to the Academics Conference in September 2010.

Supporting measures

It is undoubtedly right for these essential improvements to be led by the Education Panel. However, I think the concerns raised are sufficiently serious that many more of us have a duty to provide whatever assistance we can. I have in mind three specific groups:

- 1) The JBM has a crucial role to play in requiring substantial changes to ensure that we reverse the current deterioration and to drive the implementation of these changes through the accreditation process.
- 2) Members of Industrial Advisory Panels to Civil Engineering Departments also need to debate priorities with their academic counterparts. As one example, there is little to be gained in requiring ever more concentration on health and safety, if it is to the detriment of core teaching on the understanding of structural behaviour – with potentially much more serious safety implications.
- 3) Branch and Divisional Committees need to establish close links with all the Universities in their regions and then to offer to provide whatever help is needed to improve the relevance of the teaching of structures and design. Some already have outstanding relationships, these need to be replicated everywhere.