Report

Promoting teamwork and sustainable design

The IDBE Masters programme offers practising professionals a structured process of interdisciplinary education and professional development. Julie Jupp and Sebastian Macmillan, who run the course at Cambridge University, explain

We often take the built environment for granted without realising the benefits it brings. It clearly influences our quality of life; well designed schools contribute to educational attainment, hospitals to patient outcomes, offices to productivity, public open space to recreation and well-being, while attractive towns and cities generate civic pride and tourism. The converse is also true; more policing and healthcare are needed where the built environment is poor.

Alongside the issue of social outcomes is the increasingly important risk of environmental impact, including climate change. We urgently need to be providing facilities that minimise resource use in their construction, minimise energy and water requirements, and limit damage to the natural world.

The Interdisciplinary Design for the Built Environment (IDBE) masters course aims to equip all its students with the skills needed to meet these challenges. An underlying principle of the course is that this demands effective interdisciplinary understanding and collaborative working. The course aims to help members of multi-disciplinary teams to work together effectively, harnessing their knowledge and expertise in the design and delivery of an integrated product.

Traditionally, some of these abilities develop with experience. But commercial pressures are often such that individuals can now find themselves in positions of considerable responsibility early in their careers. Most of those taking the course have demonstrated their abilities in their core disciplines and are moving to strategic and leadership roles for which they may well be under-prepared. The course provides a route for accelerating progress towards professional maturity.

The objectives of the course include giving students a strategic overview of the construction industry and of the production and management of built environment, as well as a critical perspective on the everyday knowledge and assumptions made in practice. The course also raises awareness of current research in the sector and its potential and limitations, and provides an introduction to professional ethics and the responsibilities owed by engineers and their colleagues to society as a whole.

Various practical skills are promoted including leadership and the effective management of teams, competence in negotiating, and effective communication including presentation skills. A reflective attitude is encouraged that may include developing awareness of the different and sometimes conflicting motivations and value systems of other designers, of clients, and of wider project stakeholders.

Course organisation and origins

IDBE is a 2-year part-time masters course offered jointly by the Departments of Engineering and Architecture at the University of

1 During the residential weeks, students tackle a design project in small mixed discipline teams
2 Dr Torwong Chenvidyakarn discusses daylight modelling with a team in the workshop

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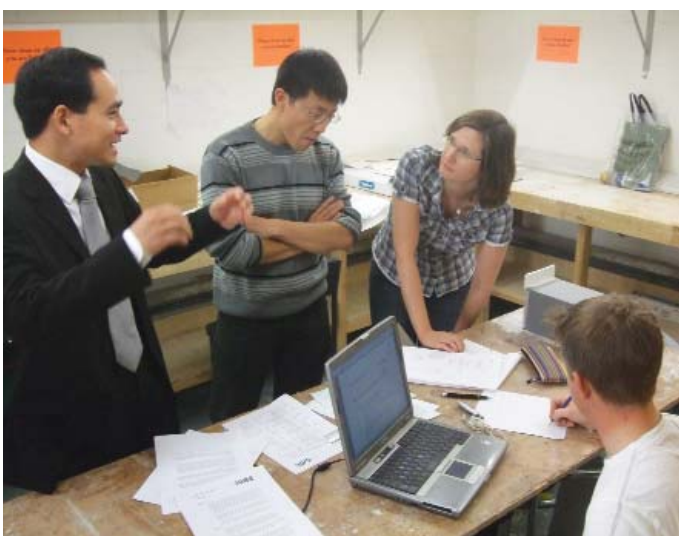

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Cambridge. Students joining the course attend 7 separate residential weeks in Cambridge over the 2-year period. Each of the weeks has a distinctive theme, which is examined through formal lectures, workshops, discussions groups and crucially, a studio design project undertaken in small mixed-discipline teams. Between the residential weeks and away from Cambridge, students complete four written assignments including a 15 000 word thesis in the second year.

The course has its origins in the ideas of Ove Arup, not only his passion for 'total design' but also his view of the importance of successful interdisciplinary collaboration. These views can be traced back to the 1930s when he found himself, as an engineer with detailed knowledge of the properties of reinforce concrete, teaching architects about its structural possibilities. Throughout his career Arup wrote extensively about the need for better collaboration between architects and engineers and, when the Arup Foundation was established to honour his memory, its objectives included an emphasis on the multi-disciplinary nature of design in engineering and architecture.

The Foundation Trustees perceived a need for an initiative to bring professionals in the built environment together to study with a set of common objectives, and supported by leading academics and industry practitioners. The learning experience was not to be limited to specific disciplines but extended to the humanities to help broaden the participants' outlook. These ideas were examined at a seminar at Madingley Hall in Cambridge in 1991. Several higher education establishments were invited to put forward expressions of interest and, after an exhaustive selection process, the Foundation agreed to support the Cambridge proposal for IDBE.

Consequently the course was established at Cambridge and admitted its first cohort of students in July 1994. It was the first part-time course at Cambridge, but has since been joined by half a dozen others. Since its inception more than 150 students have graduated from the course.

Additional financial support in the early years was generously provided by the Happold Trust and the Isaac Newton Trust, and many engineering students on the course gain support from the Panasonic Trust.

The early years of IDBE coincided with the publication of the Latham and Egan reviews of the performance of the construction industry. Many of the ideas in both reports were entirely compatible with the objectives of the course, and IDBE helped to deliver the 'rethinking construction' agenda to professionals taking the course. Since that time, the sustainability agenda has become increasingly important nationally and internationally, and course content has evolved to make sustainability a major component. There is no loss of ambition in this change. We take the view that sustainability is not under the control of any single discipline but instead needs all disciplines to share a vision and to work effectively together to deliver it. Sustainable construction needs integrated teams.

Who takes the course?

The entry requirements for those taking the course are for a minimum of 3 years post-qualification experience. In practice, most of those taking the IDBE course have more than this, most are qualified professionals with at least 5 years experience.

The course recruits up to 25 students/year, of whom about one third are engineers (structural, civil, and building services), one-third are architects, and the remainder are from related disciplines such as surveying, project management, real estate, planning, landscape architecture, and so on. Up to one third are international students. About a quarter are female, and we should be pleased to see this number rise.

In common with most UK masters degrees, entry requirements include an upper second honours degree, although this may be waived in exceptional cases. All applicants are interviewed and the course aims to attract a lively and articulate cohort, since communication and learning from one-another are important aspects of the course. Students on the course learn a great deal from each other.

Recent graduate and recipient of an IStructE Educational Trust Bursary, Fiona Cobb, said: 'While I had slight reservations about how the mixture of students would affect my experience on the course, the group debates generated by this mix have been one of

Educational Trust Bursary

The Institution's Educational Trust sponsors an annual bursary for a structural engineer on the IDBE programme. Since its introduction six students have benefited from the Educational Trust bursary which has proved successful in assisting talented young engineers. Fergus McCormick and Kate West have provided the following feedback on their experiences.

Fergus McCormick, Structural Engineering Leader at Buro Happold

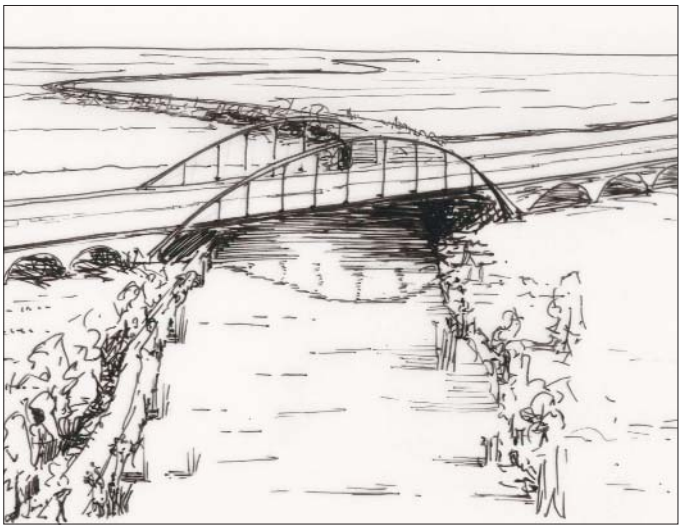
The Masters course was proactive in enabling participants to clarify professional objectives. For myself, this resulted in moving to a practice which leads many sports engineering projects. I currently lead the structural engineering team for the 2012 Olympic Stadium and actively pursue opportunities in stadium engineering in a number of emerging markets.

Kate West, Structural Engineer and Design Team Leader at Arup

After 7 years practising as a structural engineer and as an Associate with Arup (London office), I am now working in a new Design Team Leadership (DTL) role. When I started the course, I was working in this emerging area as an Assistant DTL on the 609M€ Dublin Airport T2 project. Two of the key reasons I undertook the IDBE course were to expand my understanding of other AEC professions and to develop my leadership and integrated design skills. Using the knowledge gained on the course in conjunction with my earlier DTL experience, I've helped to develop the new Arup group which focuses on the delivery of design team leadership services. Now as a DTL of large projects, I am able to more effectively lead multidisciplinary teams. One of my most recent career highlights was leading on the 400M€ Dublin Northern Quarter urban regeneration scheme where I was responsible for over 35 designers, comprising architects, engineers and specialist consultants.

The Institution of Structural Engineers Educational Trust

IDBE Masters Programme



3 Student proposals for a bridge over the River Ouse

the highlights. The course was an immense benefit and I always left the residential periods with my head buzzing with new ideas. I made numerous friends and contacts and was sorry when I reached the course's conclusion'.

Employers and fees

Fees for taking the course are typically met by employers, although sometimes they are shared by employer and employee, and some students put themselves through the course. For employers, the benefits are several.

– First, sending a student on the course demonstrates confidence in the employee and a willingness to invest in training and development.

– Second, after each of the residential weeks, employees return to their companies refreshed and invigorated by the experience of the week and with new ideas that can cascade through the firm.

– Third, the written assignments undertaken may readily benefit the organisation.

Recent examples include a student who undertook a pilot study in a potential client organisation and whose firm was subsequently commissioned for a fully professional survey. Another's thesis included a spreadsheet of facts and figures about 'embodied energy' in various building elements, and his company is now offering this as a new service to clients. Another completed a client satisfaction survey, and yet another reviewed 'sustainable energy technologies' and turned this into a business plan for a new consultancy. Provided the assignments meet the academic standards expected, they may serve this dual purpose.

Accreditation by the Institution of Structural Engineers

The course is accredited by the Joint Board of Moderators (on behalf of the Institution of Structural Engineers, the Institution of Civil Engineers and the Institute of Highway Engineers) as meeting the requirements for Further Learning for a Chartered Engineer for candidates who have already acquired a CEng-accredited Bachelor of Engineering (Hons) undergraduate first degree.

The course is also accredited by the Royal Institution of Chartered Surveyors under the project management pathway; graduates of the course, under certain circumstances which may include 'structured training', are eligible to apply for membership of the Institution.

Although many joining the course are already members of professional institutions, a percentage of graduates benefit from its accreditation by these bodies.

A typical week in Cambridge

No week on the course is the same as any other. But to give a flavour, a recent week had as its theme urban design and sustainable communities. Lectures were given by Diane Haigh of the Commission for Architecture and the Built Environment (CABE), and university lecturers presented three research projects: 'Conflict in Cities', 'Transport Modelling', and a socio economic study of Cambourne. Planner Peter Studdert reviewed new Northern European settlements, and Alex Plant spoke about Cambridgeshire Horizons. Architecture critic, Hugh Pearman, led a discussion about iconic buildings. The studio project looked at the planned expansion of the city of Abu Dhabi. Plan Abu Dhabi 2030 outlines a framework for the expansion of urban areas onto existing islands and the mainland so as to diversify the economy and expand the population. Working in mixed discipline teams the students explored one of five urban planning themes, including the creation of new districts as well as the design of public open spaces and transport systems.

Buro Happold Senior Engineer and member of the 2007-2009 cohort Paulo Silva, said: 'With many of us working on projects in the Middle East, it was a great opportunity to build on our local knowledge and more importantly, appreciate some of the broader best-practice issues that are sometimes left behind in the rush to site. This is typical of the IDBE course, which has been an excellent learning experience. I often find myself subconsciously using this new learning whilst at work, as the course has given me a much broader perspective of the issues that can and should shape our industry.'

What did they do next?

Past graduates are spread far and wide, and we are in touch with only a proportion of them. A sample is given below.

Structural engineer Vijay Vijayendran was in the first IDBE cohort (IDBE-1) and flew in from New York to take the course. He is a director of bridge maintenance with the New York State Department of Transportation, and because of his expertise in bridge emergencies he was asked to assist emergency service personnel on the night of 9/11.

Fiona Cobb (IDBE-10) a structural engineer is an Associate at Price & Myers and was selected as Young Consultant of the Year 2007 by NCE/ACE from a field of more than 40.

On graduating from IDBE, Tanya de Hoog (IDBE-12) became a founder director of a structural engineering consultancy and is now a director of the international engineering consultancy Thornton Tomasetti.

Architect Vikram Lall (IDBE-5) is principal of Lall & Associates, a successful architectural practice in New Delhi, India.

In 2008, engineer Graham Gidney (IDBE-12) published 'Building design links to infection control' in *Health Estate*, the journal of the Institute of Healthcare Engineering and Estate Management based on his IDBE thesis, and in the same year architect Matt Cousins (IDBE-10) published a book *Design Quality in New Housing: Learning from the Netherlands*, also based in his thesis.

There is also a book *Interdisciplinary Design in Practice* comprising chapters first presented in the form of talks to IDBE students, which illustrates some of the philosophy of the course. The IDBE website (www.idbe.org) provides a good deal of information about the course and illustrates some of the studio projects undertaken during the residential weeks. It also contains information about the syllabus and how to apply to join IDBE.