



Funding for Centres of Excellence

CETLs to reward and invest in excellent teaching practice to benefit students and staff

Welcome to the first Newsupdate in 2004. This issue contains the latest information on CEBE events and activities with a special feature on a Centre funded SIG group on teamworking, from which selected papers have been published.

We are also pleased to highlight the work of HEFC funded project teams across the built environment disciplines and in closely related cognate subjects, in addition to reporting on subject developments more generally. In particular, we would draw your attention to the HEFCE announcement inviting universities and colleges in England to bid for funding to set up Centres for Excellence in Teaching and Learning (CETLs). The CETLs will reward and invest in excellent teaching practice to benefit students and staff. Approximately £315 million will be available between 2004-05 and 2008-09, including £140 million for capital. Details are available from the CEBE web site and on page 3 of this publication.

The new Higher Education Academy continues to take shape with the appointment of its new Chief Executive, Professor Paul Ramsden.

Professor Ramsden is currently Pro-Vice-Chancellor (Learning and Teaching) at the University of Sydney, Australia. He is also a Visiting Professor at the Institute of Education, University of London. He will be taking up his new post in York, in August.

The Academy currently comprises Leslie Wagner (interim chair), John Webster (project manager), Anita Hirons (personal assistant) and the first full time employees, Rachel Segal and Paul Martin who have transferred in from the TOEF-NCT and will continue in their roles as National Coordinators. The majority of staff within both the ILTHE, LTSN Executive and Generic Centre will be transferred into the new corporate body, with the respective organisations being dissolved and restructured. All 24 Subject Centres will be

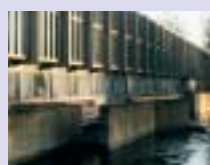
incorporated within the Academy, with a review of their role and configuration commencing as soon as is practicable, with any subsequent changes scheduled for January 2006.

The Academy's remit will be much wider than that of the LTSN's current work, as it will be concerned with the entire 'student experience' (not learning and teaching alone) and will therefore include the work of support staff. Operational structures for the new body are detailed at <http://www.heacademy.ac.uk> which also includes information about the members, board and council. The milestones leading up to the formal launch in October are as follows:

- **February 2004:** Senior Manager positions advertised
- **April 2004:** Senior Managers appointed
- **May 2004:** Senior Managers in situ
- **August 2004:** Chief Executive in situ. Academy starts first full financial year.
- **October 2004:** Academy launched. New web site launched.

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GRANTS OF £300 FOR CEBE CASE STUDIES

CEBE is collating case studies of good learning, teaching and assessment practices in built environment education. We have made funding available to enable the write up of case studies which would be useful to the wider subject community. Whilst studies on any relevant topic are encouraged, we are particularly interested in submissions under the following areas:

Teaching First Years

The first year of undergraduate courses provides particular challenges that need to be countered by both teachers and students. In architecture and landscape, for example, these challenges are particularly acute, given that students will have had little experience of the skills and methods associated with designing in their prior educational experience. Students will be expected to work within the collaborative culture of the design studio, which will often be a new experience for the student. The students will also need to develop abilities to work in uncertain circumstances, where there are no definitive correct answers to problems posed. The first year

is often seen as a foundation upon which students can build in their further studies. Case studies may provide an overview of how the first year is structured, or may provide a detailed account of how a particular project attempts to address the aforementioned difficulties. Whilst the above example refers to architecture, submissions on the teaching of first years are invited from all built environment discipline areas.

Teaching Research Methods

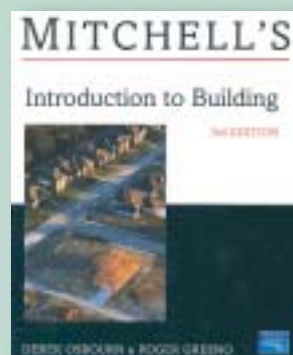
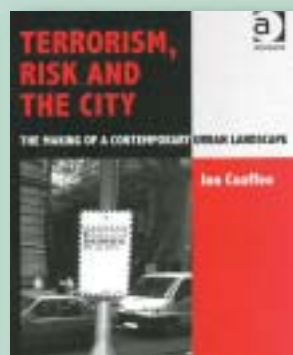
A good grounding in research methods is recognised as being important if students are

- Those interested in submitting a case study under the categories above should refer to the CEBE web site www.cebe.itsn.ac.uk for further information, guidelines and a template for case study submission. The CLOSING DATE for abstracts is Friday 30th April 2004. Successful proposals will receive funding for £300 for a case study write up which should be between approximately 2,000 -3,000 words in length. Should you not wish to write up the material yourself, an alternative could be to commission a postgraduate to write up the case study on your behalf.

Selected case studies will be published on the CEBE web site. If you are interested in submitting a study under an alternative learning and teaching topic area, let us know.

to be able to cope with intellectual, subject specific and key skills. Whilst such skills can come from a variety of modules, most programmes at some point include a course more specifically designed to address research methods. There are obstacles to overcome as a research methods tutor, such as the provision of relevant context if you are to win over students, as well as questions associated with appropriate level and content. We would like to receive submissions illustrating how departments address the teaching of research methods and the successes, problems and pitfalls encountered.

BOOKS AVAILABLE FOR REVIEW



If you are looking for information about new textbooks then the book and CD ROM review section of the CEBE website will be a valuable resource. Reviews provide an informed opinion and will help you make a decision on whether the books and CD ROMs are useful, meet the needs of the target audience and provide good value.

For full details of completed reviews, please see the Built Environment Resources section of the CEBE website at www.cebe.itsn.ac.uk where approximately 30 reviews are currently

available. We have a selection of titles listed for review and would like to offer Built Environment academics the opportunity to review these. Reviewers get the opportunity to keep and evaluate the book and publish their review on the CEBE website.

Titles currently available include:

- Chudley, R. and Greeno, R. (2003) **Construction Technology**
- Coaffee, J. (2003) **Terrorism, Risk and the City: The**

Making of a Contemporary Urban Landscape

- Osbourn, D. and Greeno, R. (2002) **Mitchell's Introduction to Building**
- Tomlinson, M. J. (2001) **Foundation Design and Construction**

Further titles may be found on our website at www.cebe.itsn.ac.uk with review guidelines. If you are interested in conducting a review for the Centre, please use the on-line form to request a review book.

New CEBE Educational Development Grants

Have you started to develop some educational resources or have ideas for materials production but cannot find the money and time to complete or revise them? Then the CEBE Educational Development Grant programme may be for you.

CEBE is making a number of educational development grants available to support lecturers develop, implement and evaluate innovative approaches to built environment teaching. The funding available is £2000 per project.

Projects should typically aim to bring into wider use innovative practices and materials already developed for local use within departments, although in some cases, funding will be given for the creation of new materials and experimentation with new approaches. It is generally expected that project outputs will be in the form of teaching and learning resources, such as a teaching pack or an exemplar module. It is a condition of funding that these will need to be designed to facilitate adoption more widely within the built environment community.

Detailed guidelines and an on-line application form are available from the CEBE website at: www.cebe.itsn.ac.uk.

The closing date for applications is the 31st March 2004.

FUNDS FOR CENTRES OF EXCELLENCE IN TEACHING AND LEARNING

The Higher Education Funding Council for England (HEFCE) is inviting universities and colleges in England to bid for funding to set up Centres for Excellence in Teaching and Learning (CETLs). The CETLs will reward and invest in excellent teaching practice to benefit students and staff.

Approximately £315 million will be available between 2004-05 and 2008-09, including £140 million for capital. HEFCE expects that more than 70 CETLs will be established, some at single institutions and some based on collaborations between two or more universities or colleges. Bids are invited from all HEFCE funded higher education institutions and further education colleges with more than 500 full-time equivalent HEFCE funded students.

Each CETL will have a distinct focus reflecting its track record of successful student learning. This may be subject-based, involve learning in the workplace, learning at a distance, or

enabling students to learn effectively in their first, final or postgraduate years.

CETLs will bestow recognition and distinction on their teachers, help to enthuse learners, provide high quality learning facilities and stimulate development and change in teaching and learning.

The new Higher Education Academy will be a key factor in ensuring the success of the CETL initiative. The Academy will support their development and activity through workshops and advice during the bidding process and by promoting collaboration and dissemination of good practice once the CETLs have been set up.

- For further information, please see http://www.hefce.ac.uk/Pubs/hefce/2004/04_05/
- The closing date for bid applications to HEFCE is Friday, 23 April 2004.

DEPARTMENTAL WORKSHOPS 2004

CEBE runs a programme of workshops that can be tailored to departmental requirements and circumstances. As we are aware that pressures of time, amongst others, may limit the availability of academic staff to travel to participate in training and personal development activities, we hope that through the provision of events focused at the department and local level, our programme will offer greater opportunity for participation.

If required, a CEBE workshop may easily be accommodated within a lunch hour session for a duration of 60-90 minutes,

dependent on the needs of the host department. Some workshops are currently being run free of charge. Please see www.cebe.itsn.ac.uk for further details and a booking form.

Workshops can be run for a minimum of five people in a department or can be scheduled on a regional basis for a grouping of Higher Education institutions. CEBE is keen to respond to your ideas and run events that are relevant to your needs. If you have any suggestions for departmental workshop topics that you would like to see available, please let us know.

ACCELERATING CHANGE IN BUILT ENVIRONMENT EDUCATION (ACBEE) CASE STUDIES

ACBEE aims to encourage universities, industry and professional institutions to work together to improve dialogue and provide more relevant training and education. CEBE has been involved with the ACBEE programme since its formulation in November 2002 and has been collating case studies of 'high quality' collaborative activity between higher education and industry and/or professional bodies in built environment and engineering education.

Following an initial call for ACBEE case studies in autumn 2003, the ACBEE steering group, which has representation from higher education institutions, industry, professional and trade bodies, met to review progress and fine tune early case studies in preparation for publication to a wider audience via the web and media briefings in Spring 2004.

ACBEE has already produced 15 case studies to date and is aiming to generate further studies for dissemination. These can range in nature from whole courses down to individual modules taught at both undergraduate and postgraduate level. If your school/department is interested in submitting a case study for approval, please visit www.cebe.ltsn.ac.uk and go to the 'Call for ACBEE Case Studies' to download the template provided and submit a brief description of your case study. The deadline for the next phase of case study submission is March 31st 2004.



The ACBEE Prospectus

On February 10th 2004, a workshop was staged to focus on the early case studies and look at 'Developing Metrics for Higher Education / Industry Collaboration'. A final glossy report will emerge from the workshop and case studies with appropriate metrics will be widely disseminated and formally launched by Peter Rogers of the Strategic Forum in London on the 17th June 2004.

■ For further details about ACBEE please contact Aled Williams: a.williams@salford.ac.uk or Pam Lowe: p.lowe@salford.ac.uk or tel: 0161 295 5944.

■ A copy of the ACBEE Prospectus which was launched during National Construction Week in October 2003 is available from <http://www.cebe.ltsn.ac.uk>

2004 National Teaching Fellowship Scheme

The National Teaching Fellowship Scheme will be expanded to 50 awards in 2004. This is in line with the higher education white paper. Rewards will be offered within three categories: experienced staff, learning support staff and new staff ('rising stars' who have been teaching for fewer than six years). One nomination will be accepted for each institution. The nomination deadline for experienced staff is 5th March 2004. The deadline for 'rising stars' and learning support staff is 16th April 2004. Briefings will be advertised at: www.ntfs.ac.uk.



E-LEARNING WORKSHOPS FOR THE BUILT ENVIRONMENT

CEBE and the University of Salford recently held two very successful E-learning workshops as part of a funded programme of activities on this issue. The events were held at Salford on 12th November 2003 and the University of Central Lancashire on 21st January 2004. They enabled broad ranging discussion amongst participants about the meaning of e-learning, the challenges and benefits of implementation within courses and how developments might progress in the future.

E-learning is a rapidly changing scenario. The first workshop attracted 16 participants from universities across the UK and was also attended by representatives from two external companies who delivered presentations on their work. Robin Hoyle of Executive Business Channel Ltd. and Jeff Buckingham of KnowledgePool, provided excellent demonstrations of their own activities and contacts and provided ideas on how they might assist academics working in the built environment.

One clear message emerging was that it is difficult if not impossible to provide e-learning materials of the best quality whilst working in isolation from other academics. Collaboration across institutions is important to avoid wasted duplication of effort. This is even more important in the context of enhanced e-learning solutions and e-learning guides.

It was interesting to hear the different definitions of e-learning and perceptions as to whether the following represented e-learning:

- Learning over the Internet
- Use of lecture notes placed on

- Blackboard for students to download
- Distance learning using information technology
- Virtual learning environments
- Learning that takes place 24/7

The second workshop on 21st January 2004 concentrated on e-learning pedagogy. Some of the challenges and benefits of developing and delivering were brainstormed. These included:

- The availability of comprehensive lecturer handout notes electronically.
- The variety of techniques being used.
- The fact that e-learning programmes need not be delivered linearly.
- The availability of on-line discussions through either the use of WebCT or Blackboard platforms.
- The provision of automatic marking of student work and rapid feedback on a personal level.
- The evidence that where students study on-line, active learning does take place.
- The option to provide students with 24/7 access to learning.
- The ability to replay teaching materials on many occasions.

- The flexibility of on-line learning.
- The positive effects on progression and achievement which require students to take more responsibility for their own learning.

Other key messages from the day were that whilst a few years ago the technology necessary for e-learning to be done effectively was not sufficiently well developed, students must now take responsibility for their own learning for this to be effective and that it was more than simply a support tool. The current term of 'blended learning' is yet more terminology to comprehend in a rapidly changing world.

Delegates were reminded that effective e-learning is not a cheap way forward. Indeed it requires a considerable investment up front. One university developing an e-learning MBA had committed over £10m to the project. A commercial firm charges approximately £7,000 to develop just one hour of e-learning. If anyone thought that putting PowerPoint slides on Blackboard was all that was really necessary then the advice was to think again! Three further workshops on e-learning are planned for the months of March, April and

May, covering the following areas:

- Student support
- Assessment
- Benchmarking
- Dissemination

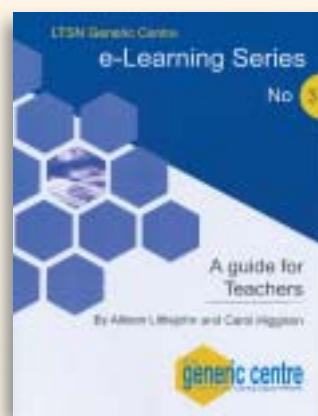
Dates for these workshops will be formalised and posted upon the CEBE website and advertised via email and in hardcopy.

■ Contact Pam Lowe at the School of Construction and Property, University of Salford, tel: 0161 2955944 or email: p.lowe@salford.ac.uk, to express an interest in attending any of these workshops.

■ In addition to the workshop series, a CEBE funded Special Interest Group (SIG) on e-learning in the built environment has been established. Expressions of interest in joining this group should also be sent to Pam Lowe. CEBE will reimburse any reasonable travelling expenses incurred. It is anticipated that three SIG meetings will be held up until June 2004, with member e-mail contact in between times.

Professor Allan Ashworth
CEBE Senior Academic Advisor

E-LEARNING SERIES IS LAUNCHED



The Generic Centre has produced a series of e-learning guides which are the first to comprehensively address e-learning issues for higher education. Produced in anticipation of the increased need for and profile of e-learning, the guides underpin the latest thinking on e-learning strategies emanating from the UK and Government.

Aimed at specific audiences within UK higher education, the guides address issues that are key to senior managers, teachers, support staff, learning technologists, heads of department and students.

They address the main areas that are delivered and augmented through e-learning such as widening participation, work based and distance learning, accessibility, implementation of the progress file and student enhancement. The authors draw on their experience to point practitioners towards what the future might hold for e-learning.

■ The Guides can be downloaded from the Generic Centre web site at www.ltsn.ac.uk/genericcentre/

Delivering the educational and training needs to meet the new urban agenda: THE IMPLICATIONS FOR HIGHER EDUCATION

At the end of 2001, CEBE commissioned the Town Planning Network to conduct an investigation into skills training in delivering the new urban agenda. The following is a report from the project's concluding conference held on 31st October 2003 at the University of Westminster, London.

What is the extent and nature of the skills deficit in urban regeneration? What are the knowledge, skills and behaviours needed for effective practice? How best can higher education work with other training providers in delivering the new urban agenda? These and related issues were discussed at an urban agenda skills event organised by the Town Planning Network, with support from CEBE.

The day began with a series of position papers from organisations with a leading responsibility for learning and skills. Bill Feinstein of the Neighbourhood Renewal Unit (NRU) began by outlining the NRU's strategy for developing skills and knowledge for neighbourhood renewal. The NRU is working at national, regional and local levels through Local Strategic Partnerships and a variety of funding and delivery mechanisms to promote effective training at the right level for all stakeholders, including residents, community groups, professionals and civil servants. The official view is that stakeholders at all levels of the

regeneration chain need the following core areas of expertise:

- **Using knowledge: analysing problems, evidence-based practice, outcome setting, design solutions;**
- **Theme knowledge: health, crime, education, worklessness, housing and the environment;**
- **Inter-personal skills: working with communities, communications, partnership working, leadership;**
- **Organisational skills: project appraisal, research;**
- **Entrepreneurial behaviour: problem-solving, spotting opportunities, risk-taking;**
- **Reflective behaviour: evaluating, learning from success and failure.**

NRU's approach is summarised in the **Learning Curve**, a comprehensive action plan, which was officially launched in October 2002 (see www.neighbourhood.gov.uk/publicationsdetail.asp?id=273).



Kevin Murray, of Kevin Murray Associates (Glasgow), addressed in a personal capacity many of the issues currently informing the Egan Review of Skills (see www.odpm.gov.uk). Ten of the 14 questions recently posted on the Egan website relate to professional skills. Murray took the view that in order to achieve 'sustainable communities' more emphasis needed to be placed on getting the 'upstream' planning processes right so that quality was built into the 'DNA' of each development proposal, thus reducing the need to resolve conflicts 'downstream' at development control stage. To achieve this, all stakeholders need to raise their game and mechanisms need to be developed to embed common working practices and values to which all professions and stakeholders can subscribe.

Murray went on to outline the range of crosscutting, inter-professional and mediation

▲ *Members of the Town Planning Network Project and Andrea Frank, CEBE (far right)*

skills, which he felt were most essential for effective delivery and floated the idea of an 'Institute of Urbanism'. This would be a generic, inter-professional body, not unlike Common Purpose (www.commonpurpose.org.uk/home.vdf), a non-governmental not for profit organisation, seeking to promote and foster leadership as a means to strengthen democratic societies. The purpose of this new inter-professional body would be to promote integration, lifelong learning and mutual understanding between the professions involved in the built environment. The Egan review has considered a 'Confederation for Sustainable Communities' with a similar purpose. Other papers during the day aired similar questions and proposed equally innovative

solutions. Dominic Murphy from the South West's Centre of Excellence and Craig McLaren from the Scottish Centre for Regeneration both explained how their respective organisations were tackling similar issues from their respective regional and national viewpoints. Both favoured flexible training programmes which met the needs of particular groups and interests whilst also fostering greater interchange of ideas and above all an empathy and understanding of the conceptual and professional baggage that others brought to the regeneration party. Hayley Rose demonstrated how the Regen School (www.regenschool.com/), the first in Yorkshire and soon to be transferred to other regions, had developed a new model of training based on close working relationships between top-notch practitioners and local universities.

The 40 or so participants themselves reflected many of the interests in training provision: university-based planning schools, Centres of Excellence, government departments and organisations such as the Commission for Architecture and the Built Environment (CABE). While no clearly defined set of recommendations emerged because of the complexity of issues involved, the overriding feeling was that a turning point had been reached, ingrained assumptions and working practices needed to be broken down, and that in many cases professional silos remained strongly defended. However, new opportunities and funding sources were emerging and several interesting and innovative approaches were already in place. While the skills deficit was clearly evident, this was problematic in that it materialised in

different forms in the different regions and nations of the UK.

Universities that run 'traditional' planning, urban design and urban regeneration programmes have much experience to offer but many define their role as being solely about high-level research and academic forms of teaching. On the other hand, the newer universities see their mission as at least in part about meeting the needs of regional and local communities. Many felt that universities need to work more closely with specialist providers in devising flexible and integrated training schemes, which made full use of block attendance, mentoring, distance and online learning. It was also argued that employers should play a bigger role in encouraging their staff to acquire new skills and to refresh others. Above all, ways need to be found to give the consumers a greater voice in expressing their needs so those providers can respond appropriately. In a number of regions, the Centres of Excellence have begun to establish their position as brokers between consumers and providers but in other regions progress has been painfully slow.

Information on the Egan Review of Skills has since been published at www.odpm.gov.uk/stellent/groups/odpm_urbanpolicy/documents/page/odpm_urbpo_022963.hcsp

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EXTERNAL EXAMINERS SPECIAL INTEREST GROUP

CEBE funded SIG examines the important role of external examiners

The Dearing Report, Higher Education in the Learning Society (1997), suggested that the role of external examiners should be enlarged. Since the publication of that report, the QAA have reduced the impact of their external quality assurance at subject level. Whilst some subject reviews will continue as part of Academic audit, there will be a much less systematic external reviewing of programmes across higher education as a whole. This, in turn, is likely to refocus the agenda even more towards the valuable work done by external examiners. It also coincides with a shift in policy to focus more on the standards that universities and their students achieve.

Historically, the external assessment of courses or programmes has traditionally been carried out at

validation, accreditation and during external examining. The greatest emphasis and frequency has been placed on external examining, since this has at least provided some consideration and discussion with course teams on an annual basis. Nevertheless, from an analysis of QAA Subject Review reports carried out since 1994, assessment is revealed as one of the weakest aspects of university provision.

This weakness is not restricted to built environment provision but across all subject disciplines. Have external examiners therefore been carrying out their role effectively? Can external examiners be expected to do this sufficiently well within the time that is available to them and for the remuneration that they receive for this important activity?

The CEBE funded External Examiners SIG Group, led by Professor Allan Ashworth, will be publishing a new guide early in 2004 which addresses these issues. The guide will cover the practice of external examining using this model outline:

SECTION A: The context of external examining

1. **Introduction**
Reference points
2. **Becoming an external examiner**
Invitation; Appointment; Training
3. **The role of external examiners**
Rights; Powers
4. **Institutional requirements and responsibilities**
5. **Modular programmes**

6. **The role of practitioners**
7. **Professional and statutory bodies (PSB)**

SECTION B: The practice of external examining

8. **The work of external examiners**
9. **Draft examination scripts**
10. **Review of students' work**
Meeting staff; Standards of student work
11. **Security of marking practices**
Dissertations; Group work; Design work
12. **Meeting with students**
13. **Board of examiners**
14. **External examiners' reports**

- ### SECTION C: Evaluation of external examining
15. **Effectiveness of external examiners**
 16. **Registration of external examiners**
 17. **Future Perspectives**

Bibliography

Appendix 1: Glossary of terms
Appendix 2: UK degree classifications 2001-02
Appendix 3: Composition of the working group

■ An External Examiners workshop will be held in March-April 2004 on a date to be confirmed. Anyone interested in participating should contact Pam Lowe: p.lowe@salford.ac.uk or tel: 0161 295 5944.



EMPLOYABILITY BRIEFINGS ARE PUBLISHED

Having a degree is not enough; graduates must now prove that they have the skills and experience needed to make an immediate contribution in the workplace.

The HEFCE funded Enhancing Student Employability Co-ordination Team (ESECT), with the LTSN Generic Centre, has published a series of employability briefings.

Each addresses a different audience in an effort to equip them to better support student employability:

- Senior Managers
- Heads of Department
- Subject Communities
- Careers Advisers
- Student Developers
- Funded projects/initiatives
- Employers

Written by experts in the field, these briefings highlight the key issues facing these colleagues, providing examples of effective practice, posing suggestions and outlining the support available. See www.ltsn.ac.uk/ESECT to download any of the publications listed above.

EDUCATORS FOR SUSTAINABLE ARCHITECTURE

The first Educators for Sustainable Architecture (ESA) Annual Seminar was held at the Welsh School of Architecture, Cardiff University on 14th January 2004. ESA evolved from the work of the CEBE funded Sustainability Special Interest Group whose report may be found on the CEBE Website at www.cebe.ltsn.ac.uk.

The ESA event was designed for the exchange of teaching programmes, experiences and ideas and to extend networking and the development of collaborative projects. Eighteen participants from as far away as Aberdeen, Plymouth and Brighton took part. In the morning session, individuals exchanged their interests and current activities in sustainability teaching. The aims and activities of ESA were reviewed. In the afternoon, a lively discussion surrounding six teaching programme presentations allowed the authors to receive observations and suggestions on their work and delegates to reflect on their own teaching.

PRESENTATIONS

The six presentations addressed engagement

with sustainability, not as an option or added extra, but as an integral part of architectural design and thinking about architecture and the built environment:

- **Genevieve Jones**, Robert Gordon University, *'Introduction to Building Design'*: the first project for First Year students which introduces concepts of good design, of which sustainability is an integral part.
- **Andre Viljoen**, University of Brighton, *'Paper Thin'*: a third year project which engages with the qualitative aspects of sustainability through the experience of making paper and then designing architecture with paper.
- **Kevin McCartney**, University of Portsmouth, *'The Bioclimatic Bus Stop: A design Exercise Using the Bioclimatic Chart'*: used in First Year and Post-graduate courses, the Bioclimatic Chart is a design tool for simple shelters in multiple climatic contexts.
- **Adrian Pitts**, University of Sheffield, *'Understanding and Applying Sustainability and Environmental Quality in Design'*: a module within the Masters programme which develops a critical and questioning attitude to



sustainability and environmental design quality.

- **Fionn Stevenson**, University of Dundee, *'Innovative Methods in Integrating Sustainable Design with Urban Issues: Dublin City as Laboratory'*: innovative timetabling, tutoring roles and groupwork in Fifth Year are used to assist in integrating sustainable design with urban design, ecological design, social design and regeneration.
- **Keith Bothwell**, Canterbury School of Architecture, *'Architecture as Metaphor: Building as Light Fitting'*: suspending context and the building's external appearance, this Second Year project develops spatial design skills through the use of daylight by using language, chiaroscuro drawing and modelling.

Two earlier ESA meetings reviewed a range of potential aims, tasks and activities which have



now focused upon establishing the Annual Seminar, promoting the conclusions of the Sustainability SIG through discussions with the RIBA, ARB and SCHOSA and promotion of the teaching resources compiled by the SIG. A spreadsheet listing over 100 teachers of sustainability in UK Schools of Architecture, can now be accessed from the CEBE web site at

www.cebe.ltsn.ac.uk/learning/sig/sustainability/index.html Examples of teaching programmes, which can be accessed via the spreadsheet, range across First Year projects to Masters courses, from theory lecture courses to design and make projects, and from environment and technology subjects through to history and social programmes. Phone numbers and email addresses have been included in the hope that access to this material will encourage people to make connections and help develop their teaching. **If you wish to submit information about your own teaching programme or update an existing entry in this comprehensive resource base, a template will be available on the CEBE web site in the coming months to enable you to do so.**

The next Annual Seminar will be hosted by the School of Architecture, Sheffield University and details will be published in a future issue of the CEBE NewsUpdate and e-bulletin. For further information on this, please contact Adrian Pitts [A.C.Pitts@sheffield.ac.uk]. For further information on other aspects of ESA please contact Bob Fowles [fowlesra@cardiff.ac.uk].

Bob Fowles
ESA Co-ordinator

Note: Current ESA Steering Group members are: Sahap Cakin (Leicester), Susi Clark (Sheffield), Bob Fowles (Cardiff), Susannah Hagan (East London), Mhairi Mackie (University of Plymouth), Adrian Pitts (Sheffield), Ombretta Romice (Strathclyde), Paola Sassi (Cardiff), Fionn Stevenson (Dundee), Roger Tyrell (Portsmouth) and Tom Woolley (Belfast).

THE LANDMAP PROJECT

Manchester InforMation and Associated Services (MIMAS), a JISC supported national data centre (see www.mimas.ac.uk) has announced the release of the Landmap project's products and services to the UK academic community. Landmap is a joint venture between MIMAS and University College London's Department of Geomatic Engineering, in addition to other partners. The project was initiated to provide orthorectified satellite image mosaics of Landsat, SPOT and ERS radar data and a high resolution Digital Elevation Model for the British Isles, all freely

available to the UK educational sector¹. This data is available in formats that are readily accessible to users of Geographic Information Systems (e.g., ArcView/ArcGis, MapInfo), Image Processing (e.g., ERDAS, PCI, ER Mapper, ENVI) and Desktop publishing software (e.g., Adobe Photoshop or Microsoft Publisher). Information on the products and their availability is at www.landmap.ac.uk.

Both the Landmap software and data are held online at MIMAS where users can either process the data remotely or download it to



◀ Landsat image draped over Landmap 3d Digital Elevation Model
Image © University of Manchester/ University College London Year 2001 - Original Landsat 7 distributed by Infoterra International

their local network. Use of the imagery in teaching and training is broad ranging, varying from illustrations to applications in environmental planning, construction, surveying and land use (the digital terrain model supports view shed analysis in planning applications, for example).

¹ Access requires institutional subscription and users must be registered with Athens in order to download the data.

STUDIO CULTURE CONFERENCE

Oxford 17-18 December 2003

'Studio Culture - who needs it?' was the theme of a conference held in Oxford on 17-18 December 2003. More than 60 delegates attended, drawn mainly from the UK but also coming from Sweden and Israel. St Catherine's College, designed by Danish architect Arne Jacobsen, and the St Cross Building by Sir Leslie Martin, both seminal buildings from the early 1960s, formed an ideal setting for this gathering of architects and design teachers.

Teaching design through project work has been a central feature of most architecture and other design-based courses for over a century. Studio-based learning, 'learning by doing', using real-world briefs and deadlines, has been seen to be an enjoyable and effective way of learning critical design skills. An almost unquestioned presumption has been that this activity best takes place in a studio environment, where individual tuition and peer learning happily co-exist. The short hand description for this idea is 'studio culture'. There has been a wide spread belief in the past that having a good 'studio culture' was an essential component in providing a creative and rounded design education. The conference addressed the current validity of this belief.

In recent years, it has become increasingly difficult to sustain a vibrant studio culture. Successive visiting boards to schools of architecture have noted a decline or lack of a studio culture where previously a strong regime existed. Observations similar to these have been reported by a number of external examiners. There is an implication that the erosion of a studio environment is synonymous with a decline in the quality of student design work. Heads of Schools point to a myriad of reasons why studio-based learning is in decline, such as pressures on staff time, diminishing resources, worsening staff studio ratios, changing student work/study patterns, inadequate funding levels, lack of 24 hour access, health and safety issues and the increasing importance of IT/CAAD, are commonly cited.

It was within this context that the event was convened. Professor George Henderson (Senior Academic Advisor to CEBE), chair of the conference, asked delegates to consider whether sustaining a studio culture was still desirable, valid and manageable. If so, how should studio life adapt to accommodate the very real pressures that exist. He challenged the



◀ St Catherine's College, Oxford. Image reproduced by kind permission of Allan Haines, The Concrete Centre

conference to consider inventive and sustainable new ways of using studios as learning laboratories, relevant to the present age. Reference was made to the recent report from the American Institute of Architectural Students (AIAS), Studio Culture Task Force Report – Redesign of Studio Culture (December 2002) ⁽¹⁾ that in part had prompted the theme of the conference. This report exposed the 'myths' that are perpetuated by a traditional studio environment (e.g. lone, long hours are essential - a 'solo artistic struggle') and went on to

redefine a different studio culture more suited to the present age (e.g. 'critiques are learning experiences, not target practice').

The structure of the two days was designed to maximise the time for discussion both in small breakout groups and in plenary sessions. Formal presentations to the whole conference were kept to a minimum. Short 'trigger papers' were prepared to prompt discussion within themed small groups. Topics included the Crit, teaching resources, collaboration, making studio days rewarding, studios real and virtual, integration, the student perspective, professional skills and representation and materiality.

Leonie Milliner, RIBA Director of Education, set the scene from the perspective of the professional institute responsible for validating architecture courses. She referred to the recent RIBA report 'Why do Women Leave Architecture?' (May 2003) ⁽²⁾ citing long hours and macho culture that tend to accompany studio life as being reasons for low numbers of women completing architecture courses and continuing into practice. She also noted the 30% reduction in the number of teaching staff in recent years, increasing student debt, and an increase in remote learning as contributory factors to the erosion of studio learning. It was made clear by Leonie Milliner that the RIBA is primarily interested in the quality of

student work being sustained above a minimum threshold and satisfying agreed criteria and is less interested in the way this is achieved. Schools of architecture are free to teach in whatever way is thought appropriate. It is not a prerequisite to teach in studios or to have a studio culture. The RIBA is not just concerned with ensuring that the lowest pass is above an acceptable threshold, but is equally interested in promoting innovation, diversity and high standards.

Other plenary sessions included a presentation by Martin Pearce of Portsmouth and Andrew Roberts of Cardiff University on their research mapping and comparison of values in studio teaching in three schools of architecture. Allan Haines, Head of Education at The Concrete Centre, gave an overview of the ways in which the new Centre can support teachers of architecture. An evening lecture was given by architect, Steven Hodder, on his current commission to refurbish St Catherine's and add new buildings to the college.

One of the main benefits of the conference was the opportunity for teachers to meet and discuss common challenges related to design teaching within a studio context. It is not possible here to do justice to all the various discussions. However, a number of themes emerged which were summarised at the end of the event:

■ Institutional Context:

The professional criteria for validation and prescription ('one size fits all') might inhibit diversity of delivery in spite of calls for 'variety and innovation' from the RIBA. However, 'design' is a requirement (minimum 50% content), so it is here to stay. The quality of student output is the key essential in validation, not the learning process. Therefore having a 'studio culture' is not a requirement from the professional bodies. Teachers of architecture should look at how best to teach design within their particular context, without presuming that this has to take place within traditional studios.

■ The Future of the Studio:

Common challenges were identified such as larger numbers of students, pressure on space and staff time. Some alternative models for studios were suggested:

Take the studio outside the studio: get rid of the traditional studio; move towards 'de-schooling' and decentralisation with students self-selecting where they work and with whom; universities

could then concentrate on providing facilities not available/possible at the satellites.

Redefine the role of the studio: in the future a studio may not necessarily be a 'design' studio but change from 'live in' to 'drop in'. Communal facilities would be provided (e.g. soft model making and wired for IT) as well as offering a place to meet. There would be emphasis on communal activities (group working or seminar-style activities) and a combination of structured and timetabled events as well as open access for meeting other students and seeing work on display.

Manage the studio according to need: on the presumption that not every student in all years needs a studio space, a graduated use could be envisaged, for example variations on: Year One - all students have a dedicated studio space; Year Two onwards - students opt in or out; Year Five - no students have a dedicated space.

■ The Crit:

There was a consensus that crits should be non-adversarial. Some delegates preferred the term 'review' rather than 'crit'. Various models were offered according to circumstances and learning objectives i.e. table-based, discursive crits; lecture room-based crits to cover generic rather than individual observations; student-led crits; silent crits; crits using overhead projectors; crits by e-mail, fax, etc. Reference was made to a number of articles and publications on this subject.

■ Studio Culture:

A number of thoughts were expressed about ways in which the studio could be more effective in terms of being a learning environment. These included making the studio culture less 'macho', more minority-friendly, more collaborative and integrative, more pleasurable and useful. The type of studio could vary according to need. The physical attributes and management should reflect student preferences as much as teaching pedagogy. Developing a studio culture and student use of studios must reflect real needs rather than being enforced arbitrarily. Students prefer to be treated as individuals and enjoy a degree of self-selection even though this can be difficult given the increasingly mandatory nature of course content. More inventive ways of staffing studio tuition could be explored, for instance the idea of a 'buddy system', attaching

➔ continued overleaf

Preparing for Validation and Planning for Prescription Workshop

● RIBA, London ● 28th April 2004

As part of a series of CEBE sponsored one-day workshops on the theme of preparing for validation and prescription, a further event is now being scheduled for April 2004. This is a repeat of an earlier, highly successful workshop, held in February. The day will be dedicated to the procedures and criteria for the validation of Architecture courses and the prescription of qualifications. The event is supported by SCHOSA.

The first half of the day will consist of presentations made by senior personnel from ARB, the RIBA and academe. In the afternoon, delegates will join small discussion groups to

consider the most effective means of engaging with the new arrangements. Participants will have an opportunity to share best practice and personal experiences.

The workshop is primarily aimed at course/programme leaders/administrators and teaching staff, rather than Heads of School. It is also intended to inform and assist external examiners and university QA personnel involved in Architecture courses (Parts 1, 2 and 3).

Four representatives can be accommodated from each School of Architecture. The workshop is free of charge, but booking is essential. For further information and booking forms please contact Diane Bowden, email: Bowdend@cardiff.ac.uk

STUDIO CULTURE CONFERENCE

➔ continued from page 11

each first year student to a fifth year student and the use of graduate assistants.

Papers from the conference will be published in CEBE's new transactions series and on the Centre's website. The conference was sponsored by The Concrete Centre and CEBE and supported by the Royal Institute of Architects and the Landscape Institute. The Concrete Centre⁽³⁾ is the new central development organisation for the UK's concrete and cement sector. It has a strong commitment to supporting built environment education and training. By general consensus, the conference was an enormous success. Similar collaborative events are being considered for the future.

REFERENCES:

- (1) The Redesign of Studio Culture, AIAS Studio Culture Task Force Report, American Institute of Architectural Students, December 2002, published on www.aiasnatl.org
- (2) Why do Women Leave Architecture? Ann de Graft-Johnson, Sandra Manley, Clara Greed, University of the West of England, May 2003, published on www.riba.org
- (3) The Concrete Centre, visit: www.concretecentre.com

Professor George Henderson
Senior Academic Adviser, CEBE

Historic agreement is signed

In January 2004, the Royal Institute of British Architects (RIBA) and British Institute of Architectural Technologists (BIAT) signed an historic agreement to provide a framework for collaboration between the two bodies. This will facilitate closer co-ordination on matters of mutual interest, including provision of services, CPD, professional education and industry liaison and representation. The agreement recognises the distinct nature and standing of the respective professions of architecture and architectural technology, and the status of qualifications leading to full membership of BIAT and the RIBA.

COBRA 2004: Responding to change



COBRA 2004, the RICS International Construction Conference, provides an ideal meeting place for leading practitioners and researchers in the built environment to exchange ideas, establish collaborations and gain new knowledge and understanding. The conference, at the world famous Headingley Experience from 7-8th September, promises to be a major event in the RICS calendar. Nicholas Brooke, International President, firmly believes that it is an event the built environment community should support:

"COBRA provides an international platform for researchers to share their vision with leading industry wide property organisations."

The conference identifies six key themes:

- Bridging the Skills Gap
- Achieving Best Value
- Designing for All
- Legal and Commercial Relationships
- Social Ethical and Corporate Responsibility
- Sustainability and Climate Change

Robert Ellis, National Teaching Fellow and Chair of the COBRA Organising Committee, is confident that this year's conference will be a major showcase for the built environment. He says: "Researchers and practitioners alike have a unique opportunity

to enter the debate on the future of our industry and it is pleasing that education should feature high on the agenda."

Bridging the Skills Gap

The CITB states that companies with higher skills make more money, complete more projects on time and have more satisfied clients. What are these skills? How might they be acquired? And, who should the industry be targeting to bridge the skills gap? These are the principal questions that papers should seek to address.

The conference's international dimension is reflected in the composition of the Organising Committee with representatives from Australia, Hong Kong, South Africa and the USA taking an active involvement in the

or browse the resources as thumbnails in a web environment and choose a selection for their own project or teaching purpose. It will also be possible to annotate and edit the data and then save your personal collection for publication on the web. A large number of exemplar collections will be produced that can illustrate and inspire others for their own institutional and teaching contexts. In the second stage of ARCHES, lecturers and students will be able to create and deploy these collections in a variety of educational scenarios.

Using a variety of delivery modes in modules over a range of learning levels in further and higher education and beyond, creative use of these resources will transform aspects of traditional pedagogy and introduce innovative teaching practices.

■ For further information, please see www.warwick.ac.uk/ETS/arches/ or contact: Jay Dempster
Centre for Academic Practice
University of Warwick
Email: Jay.Dempster@warwick.ac.uk

This article is based on a feature which appeared in the Association for Learning Technology newsletter, issue 43, October 2003. Reproduced with kind permission.

ARCHES

Antiquity Related Collections Harnessed for Educational Scenarios

ARCHES is a project which aims to imaginatively re-purpose an exciting range of materials on ancient Greece and Rome between three educational contexts, further and higher education and an international online resource. The project has been funded for two years by the Joint Information Systems Committee (JISC) under the Exchange for Learning Programme (X4L).

ARCHES will make a new collection of VR objects relating to Greece and Rome, prepared by the University of Warwick over the last five years, available for national use. These objects will be of immense value to disciplines such as Art History, Architecture, Classics, the Performing Arts and IT Modelling. No similar VR objects currently freely exist in the public domain. Enabled by a number of recent grants from the University of Warwick, project members in Classics and Theatre Studies have created a collection of



1,500 original digital images of Roman artefacts. Through ARCHES, these two collections will become freely available to further and higher education in the UK and international educational sectors for the first time. The public web site, which is still under development, is available at <http://arches.luminas.co.uk/>

The project brings together lecturers from the Arts Faculty departments at Warwick and City College Coventry, with educational developers and technologists from the Centre for Academic Practice and the IT Services elab at Warwick. The aims of their work include the creation of a searchable online



database for tutors and students which can deliver resources to diverse technical and educational environments. It is hoped that in a broad sense, this will provide valuable models for repurposing electronic resources for use in learning and teaching.

During year one of ARCHES, the team is focusing on the technical architecture for submitting educational descriptions of the resources and addressing issues of access. It is hoped that a facility can be produced whereby staff and students alike, can search

promotion of the event. Keynote speakers include **Ron McCaffer** (Professor of Construction Management & Director of Business Partnerships, Loughborough University), Professor **Simon Lee** (Vice-Chancellor of Leeds Metropolitan University), **Steve Irving** (Director of Research, Faber Maunsell) and Professor **Julienne Hanson** (Professor of House and Form, Bartlett School of Architecture).

■ COBRA 2004 is sponsored by White Young Green and is jointly hosted by Leeds Metropolitan University and RICS Yorkshire and Humber.

■ See www.Cobra2004.co.uk or email info@cobra2004.co.uk for further details.

ARTIFACT IS LAUNCHED

The Manchester Art Gallery and London Institute Gallery have launched Artifact, a free online gateway providing access to art and creative resources for the educational community. The galleries hope that Artifact, available at <http://www.artifact.ac.uk>, will cover a vast range of subjects from architecture, traditional art and new media and creative industries.

Based at the Manchester Metropolitan University, Artifact is a partnership between CALIM (the Consortium of Academic Libraries of Manchester), South Cheshire College, MIMAS at Manchester Computing and the London Institute.

ONESTEP INDUSTRY AND JOBS NEWS SERVICES FROM EEVL

EEVL, the Internet guide to engineering, mathematics and computing, has announced the launch of two new, free services, which make it much easier to scan the latest industry news and jobs announcements from top sources in engineering, mathematics and computing. The new services are very easy to use and have been named **OneStep Industry News** (www.eevl.ac.uk/onestepnews/) and **OneStep Jobs News** (www.eevl.ac.uk/onestepjobs/).

The OneSteps use a data format called RSS (Really Simple Syndication) to aggregate content. The default displays intermingle headlines from various top sources. The simple 'OneStep' interface allows scanning of all news/jobs items and those clustered by subject heading (e.g. all engineering job announcements can be scanned separately and likewise all computing and maths jobs and announcements). In addition, items from any one individual source can be scanned separately. An archive of recent items can also be searched. These two new services will make it a lot easier to find industry news and job announcements in the subjects covered.

EEVL is funded by JISC through the Resource Discovery Network (RDN) and is available on the Web at: <http://www.eevl.ac.uk/>

■ For information please contact: Roddy MacLeod, EEVL Manager, Heriot-Watt University Library, Edinburgh, tel: 0131 451 3576, email: r.a.macleod@hw.ac.uk



In a continuation of our regular column devoted to progress reports from FDTL, TLTP and other Built Environment related projects funded under a variety of initiatives, we feature updates of the work of the FDTL Phase III projects PBLE, SLICE and LINK

PBLE ANNOUNCES FINAL DELIVERABLES

The Project Based Learning in Engineering (PBLE) FDTL III funded project is pleased to announce the completion of its key deliverables. Available to download from their website, the project has two complementary products:

The PBLE Guide is a handbook for all aspects of Project-Based Learning for Engineering. Written by, and aimed at, engineering academics, it includes many case studies and other chapters on subjects as diverse as learners to assessment. The Guide is available from the project website, <http://www.pble.ac.uk>. When PBLE completes, the guide will continue to be available from LTSN-Engineering.

There are also a set of staff development resources, based around the guide. Also on the project website, these will be maintained by Loughborough University Staff Development Unit and distributed via HESDA, the national organisation for staff development. Contact the unit director, Andy Wilson (d.a.wilson@lboro.ac.uk) for information.

PBLE is funded by HEFCE under FDTL3, project code 43/99. PBLE management would like to thank all the academics who have participated in the last three years.

STUDENT-CENTRED LEARNING IN CONSTRUCTION EDUCATION

What's been happening on the SLICE project?

SLICE is an FDTL 3 funded project which aims to stimulate interest in student centred learning (Sc-L) and enthuse staff to experiment with Sc-L. The SLICE team spent many painstaking hours researching the definition of Sc-L and eventually the team settled on the phrase: "Learning that provides some flexibility in terms of place, pace, even perhaps in terms of content too."

The materials produced by SLICE are designed to supplement and not replace lectures. The first key output has been the production of a Handbook on Student Centred Learning which was launched with good review at a CEBE supported event in Birmingham in May 2002. Two copies of the Handbook were sent to every Building, Surveying and Civil Engineering Department in the country. Following the launch, an intensive awareness campaign was instigated. This involved presentations of refereed papers at various major events such as the International Conference on Engineering Education (ICEE), the Building Education and Research (BEAR) conference which took place in Salford in April 2003, and a series of other



The SLICE Handbook

regional and national events. The second project output is the production of specialist toolkits for lecturers and associated learning packs for students. The subjects have been carefully chosen following extensive research involving building, surveying and civil engineering colleagues. Topic areas are:

- Building Pathology
- Environmental Science
- Site Surveying
- Construction Health and Safety
- Quantity Surveying

- Behaviour of Structures
- Sustainability
- Water Engineering

The toolkits for lecturers and the students' learning packs are available in printed form and on CD. All materials are free and can be photocopied, altered or amended to suit. All the SLICE team require is that you acknowledge copyright, otherwise the material can be printed or distributed freely.

The material on the CD is available in two file formats to maximise flexibility: Adobe PDF™ (which requires Adobe Acrobat Reader™ - available free from <http://www.adobe.com>) and Microsoft Word™. The Word version can be easily altered or adapted. Should you want to use the material in stand alone form without alteration, the Adobe PDF™ version is very stable. Lecturers can load the PDF version on to the Web to make materials available to students online.

Each of the toolkits contains ideas on how you might make the topic more flexible. There is also a list of resources where you might be able to find further information on preparation for Sc-L. The student learning packs contain questions, answers and feedback to help students learn. Most of the learning packs contain an end test so that students can see how much they have learned.

For a specialist toolkit and learning pack contact the SLICE team on (01752) 233654 or email tracey.webber@plymouth.ac.uk. There is no charge. However, the SLICE team is undertaking an extensive dissemination tour and would like to hold a workshop at your institution to help you get the best out of the toolkits. Please notify the team if you would like to host a workshop.

Steve Donohoe
Project Leader, SLICE

TYPICAL EXTRACT FROM A BUILDING PATHOLOGY LEARNING PACK



Similar houses, yet the one on the left is 150 years old, the one on the right is new



Look at the two photographs above. Could you describe the likely construction methods used in each?

Extract from the Learning Pack on Building Pathology written by Paul Murray

PROJECT LINK: Conclusions and the future

Linking Teaching with Research in Planning, Land and Property Management and Construction (aka Project LINK) is an FDTL phase 3 project into the 'what, where and how' of linking teaching and research. This article provides an update on the findings and resources of the project, what stage it is at now and introduces some work which was undertaken by a number of 'cascade partners' financed by the project, to look at the 'link' in their institutions.

Project LINK began with the premise that research and consultancy (professional practice) were central to the quality of the student experience, especially in vocational disciplines such as the built environment. The conclusions at the end of the project concur with this:

a) In a knowledge-based society, research and consultancy skills are key attributes in vocational and professional fields like the built environment. Graduate professionals increasingly need core skills in managing, synthesising and deploying subject-based knowledge to derive solutions to real-world problems. Integrating teaching with research helps to embed these core skills. Acquiring research and consultancy skills enhances employability and provides graduates with the resources and confidence to understand and adapt to a society whose knowledge-base is fast changing.

b) One of the key outcomes of the project is the understanding that integrating teaching and research does not usually happen automatically. It needs systematic action through change strategies at three levels:

- institutional level policies and strategies for teaching, research, staffing and programme development /audit.
- faculty/departmental level policies for staffing, workload planning and managing teaching and research.
- curriculum level - design, delivery, assessment and programme monitoring.

Change Strategies

During the main funding period, the project



focused on the first two points above. Conclusions were that the academic department is perhaps the key level for focused attention in developing and supporting the link. It is here that staff roles are most clearly defined and where teaching and research are most directly organised. Potentially, it also where teaching and research can most effectively be linked or remain in separate and even hostile worlds. The project has identified change strategies needed to enable the link to occur and has developed a model for these:

- The change strategies are described at three levels: department and subject groups; institutions; national/international disciplinary communities.
- The model provides a staged approach to developing and enhancing the teaching and research interaction which can be used at department level.

These change strategies, model and guidelines to assist in developing the link at the three levels are available as resources from the project website.

Project Resources

The LINK project website contains comprehensive resources to assist in understanding and developing the link

between teaching and research. The key features of this resource base are:

- comprehensive web-based guidelines on linking teaching, research and consultancy, curriculum design and evaluation.
- conceptual models for managing change and for understanding different approaches to linking teaching, research and consultancy in the curriculum.
- web-based guidance on change strategies for linking teaching, research and consultancy.
- a '15 Points' leaflet setting out the purpose and value of linking teaching, research and consultancy in the Built Environment.
- a collection of case studies showing various ways in which the linking of teaching, research and consultancy can be effected in built environment disciplines.
- web-based publications including position papers, conference papers and journal articles.
- links to other websites.

Cascade Partners

In addition to these resources, developed by the consortium partners, the project also commissioned a number of 'cascade partners' to undertake studies on linking teaching and research in their schools and institutions. Articles from four cascade partners (Bolton Institute, Heriot Watt University, Napier University and the University of Gloucestershire) are featured on pages 17-24.

The future

The main phase of project LINK finished in September 2003 and was marked by a highly successful international conference 'Building the Link' held in Oxford. The project is now continuing work for a few more months to undertake a number of specific tasks:

- To build on the success of the 'Building the Link' conference and publish a selection of edited papers in a book.
- To prepare a short set of guidelines on, and implications of, linking teaching, research and practice for professional end users. It is hoped that these will be presented to the Education Committees (or similar) of the RTPI, RICS, RIBA and CIOB.
- Commission a short piece of work to investigate the nature of the link in architecture.
- Undertake work on transferring the project findings into four non-cognate disciplines by working with one additional department in each of the four consortium institutions (i.e. Department of Hospitality, Leisure and Tourism at Oxford Brookes; Department of Psychology at the University of Westminster; the Faculty of Health and Social Care at University of the West of England and the School of Social Science and Law at Sheffield Hallam.

For information on Project LINK and access to the resources, visit <http://www.brookes.ac.uk/LINK>

The LINK project was undertaken by a consortium of four universities led by Oxford Brookes and involving Sheffield Hallam University, the University of the West of England and the University of Westminster. Its main period of funding was September 2000 to September 2003.

Bridget Durning & Roger Zetter
Department of Planning, Oxford
Brookes University

Bolton Institute's assignment-based approach to challenging design guidance

Debate is often had about the role in design "teaching" of familiarisation with standards and codes, links to underpinning science and the development of creativity. John Parkin, of the Built Environment Department at Bolton Institute, developed an assignment that focuses on this debate in a different way, asking students to constructively challenge design guidance, using research evidence and the critiques of commentators, as a way of embedding a greater understanding of the provenance and limits of such guidance.

The module in which the assignment was set is a final level transport engineering core module forming part of the BEng (Hons) Civil Engineering degree course. As is typical at Bolton Institute there were a number of part-time students, mature students and students who had already worked in industry on a sandwich year present in the cohort. Bolton characteristically has very strong links with industry.

Students were provided with a comprehensive pack of design guidance presently in use for the design of on-road facilities for cycle traffic, critiques by leading commentators and results from basic research in the field. They were then asked to review the design data, providing a critique of the present direction of design guidance and relevant research evidence and produce a short report recommending the most important actions.

A questionnaire was issued soliciting views on the learning students had achieved through the assignment. It was found that the students' view on research was revised, recognising it as a practical necessity for input to the writing of design guidance and as a resource intense activity with a distinct process of experimentation when testing a theory.

John Parkin was "pleased by the way that a number of students approached the exercise and 'buried themselves' in the reference material so that they could make appropriate recommendations." He notes: "It is also pleasing that some students thought that it was better, at least on some occasions, to be

provided with the relevant material so that they did not spend much of the time that they would allocate to the assignment, looking for the data, rather than analysing the data." This recognition that analysis can easily be squeezed out if too much time is devoted to finding the relevant information in the first place, is important and has wide ranging implications.

The Built Environment Department discussed the assignment and staff thought that there was value in this type of assignment, particularly at level 2 and level 3 of a degree programme. It is often the case that there is insufficient development in the type of assignment offered to students as they progress from level 1 into the higher levels. Assignments with a greater requirement for analysis, of the type required in the Design Challenge Assignment, would prepare students better for the rigours of the final year project.

Overall, the project has been a success and demonstrated some learning points for the programme as a whole. These are that:

- ◆ Specific and relevant material should be provided to the student. This avoids unnecessary time being used by the student in finding the relevant material in the library.
- ◆ Material of appropriate depth must be provided to students. Some material may be relatively straight forward to digest, other material may be so specialist that additional class time may be required to 'draw them in' to the depth required.
- ◆ A precise and penetrating demand for analysis should be made of the students in the assignment brief. This will discourage students, ever-hopeful of a decent performance, from merely grazing the material at surface level.
- ◆ Some students readily form opinions, even though they may be based on shaky ground, while other students need to be coerced into forming an opinion. The depth of evidence provided and the demand for analysis required should provide a solid basis on which both the over-confident and the unsure may form reasonable concluding opinions.

Any queries should be directed to John Parkin, Bolton Institute email: j.parkin@bolton.ac.uk

A perennial problem in planning education has been to embed learning about planning law and development control practice. Too often teaching about the law of planning and the decision making procedures of development control have been regarded as dry, boring and negative (not necessarily in that order, but certainly often all at once).

Traditional approaches have focused on developing an understanding of how the current statutory planning regime operates, often through case examples of planning applications, but often divorcing the teaching of the law of planning (the limits of 'development', case law etc) from the context of policy and the application and interpretation of the law through practical decision making. Students forget as soon as they learn about the general development order, practice advice notes, policy guidance, primary and secondary legislation, as evidenced in generally poor performance where the main assessment is written examination.

The motivation for this project was an aspiration to embed in students enthusiasm for inquiry about the underpinning evidence for planning reform and critical perspectives about the scope and limits of the UK planning system. The project was used to restructure teaching in planning law and development control through exploitation of the project leader's research and publications, allied to associated government and other publications relating to the modernisation of the planning system in the UK, with particular reference to Scotland. The intention was to restructure learning about the statutory planning system through development of an inquiry-based approach focusing on the evidence base for reform. This was intended to develop greater understanding and insights about key aspects of the statutory framework, stimulate further enquiry and new research agendas.

Timetabled postgraduate learning in Planning Law and Development Control was restructured and refocused for a group of postgraduate learners on the two-year Diploma/Master of Urban and Regional Planning, accredited by the Royal Town Planning Institute. The student group comprised 18 full-time (first year) and seven part-time (second year) students, the latter working in a range of planning and planning-related organisations (eg local authorities,

Developing inquiry-based teaching and research capability in planning regime evaluation

Learning about the statutory planning system need not be dry and boring if it is driven by research-led teaching, according to the conclusions of an experiment in research-led teaching carried out at Heriot-Watt University

government agencies, planning consultancies). Students were divided into groups of 4-5, each with a brief to research one feature of the statutory planning system, namely: national policy guidance; development plans; development control; planning enforcement and administrative appeals.

Each group was required to: identify and gather relevant evidence, including government consultative papers; review proposals for reform against the available evidence base of performance; assess the rationale for reform in light of the evidence and suggest alternative proposals as appropriate. Students exploited published sources, assisted by an initial seminar with a group of practitioners and were supported by progress tutorials.

Student findings included proposals for radical reform to some of the key fundamentals of the UK statutory system including: a statutory purpose for land use planning; a national spatial strategy in the context of EU/UK policy; overhaul of national policy guidance; a more strategic approach to planning enforcement; a questioning of the rationale for new-style development plans; the use of mediation in the planning process; limited third party rights of appeal; more disaggregated information about the pattern of planning appeals by subject and success rate, in order better to inform judgements about equitable outcomes from planning decisions.

Overall, the project demonstrated effective teaching and learning methods for research-based learning and skills development in planning law and development control. It is clear from the outcome of the assessment, and in the structured student feedback, that all have benefited from the research focus of the project

by demonstrating critical depth in understanding the scope of the current statutory planning system, the evidence base of performance, and the rationale for current reform agendas. In addition, the project stimulated critical thinking about the statutory planning system and generated some radical ideas for reform.

Structured student feedback from the project showed that they found the research-led approach demanding. Students found the assignment a very positive learning experience. One commented: "I now feel I can hold my own with colleagues - which is a great feeling." Another referred to their "deepening appreciation gained of the planning system", while another felt the project "made you think 'out with the current system'". This last comment demonstrates that at least some students will graduate with a healthy disrespect for the established scope of the statutory planning system in the UK, since it is in that healthy disrespect that is to be found the seeds of future reform.

Though the student group comprised postgraduate learners, the approach is transferable to undergraduate learners at Level 3.

Tutors, as well as students, can learn from research-led teaching. This is not a one-way process. It can be a positive learning experience for both student and tutor. Students can operate as effective collaborators on a research inquiry, leading to deeper insights for both. Research-led teaching works. It can stimulate further research agendas and enquiries in the research-active tutor.

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PROMOTING SUSTAINABLE DEVELOPMENT of built and human-altered environments

Current Government policy (*White Paper on the The Future of Higher Education, February 2003*) requires many institutions of higher education to choose where to invest in excellence - in research or teaching. While research intensive universities would claim excellence in both (and in the case of some departments and individuals justifiably), the Paper makes little reference to how changes in policy will affect the synergetic relationship between teaching and research

within the student learning experience across the HE sector. This inevitably challenges the teaching-research nexus and the opportunity for positive feedback between teaching and research for those students who for various positive reasons select institutions at middle to lower levels in the RAE league (see *Jenkins, 2002; Healey, 2003; Jenkins, A., Breen, R. and Lindsay, R., 2003*).

This article does not seek to engage with the heated national debate around the efficacy of links between research and teaching excellence and the impacts on the short, medium and longer-term student learning environment (see *Jenkins 2003*). There is now, however, guidance to institutions, departments and individuals in how to capitalise on the research-teaching nexus (see *Jenkins and Zetter, 2003*). The links between teaching excellence and excellence in professional practice in the quality of more vocational courses is less contested but equally important. The key question is, however, do teachers or facilitators of learning in higher education teach differently if they have been involved in primary applied research or practice from those who have not had this experience. If 'yes', do these differences inherently aid the student learning process or can these differences be capitalised on to enhance the student learning environment/ experience? The LINK team at the University of Gloucestershire (UoG) proposes that the learning experience is different and has the potential to be better, if integrated with active learning strategies

that are supported by institutions and departments and facilitated enthusiastically at an individual level.

A growing focus within geography, environmental management and built environment at UoG is in the area of applied/ contract research and funded consultancy/ practice-based work, with increasing inter-disciplinarity in the work undertaken. This applied expertise has particular potential benefits for courses that have an applied or management focus (e.g. MA/MSc Environmental Policy and Management) or that are explicitly professional and vocational (e.g. BA/MA Landscape Architecture), if the benefits of the teaching-research links can be exploited. The UoG LINK group aims to explore and share twelve useful principles. These can be used to help strengthen and develop the links between teaching, applied research and practice in promoting sustainable development of the built and human-altered environments and their design and management in urban and rural contexts. Here, the focus is on the learning environment for both undergraduate and postgraduate taught students. The principles vary in the level of their focus, embracing institutional, Head of Department and individual tutor levels. They are transferable between departments, institutions and disciplines.

Principle 1:

Staff as individuals (or groups) need to be involved in both teaching and

applied research and/or practice. For there to be effective links, staff involved in research or practice-related activities need to make a direct personal contribution to teaching, as well as utilising their expert knowledge and skills in the development of resources that inform the curriculum at undergraduate and postgraduate level. Staff with major leadership responsibilities for the quality of the learning environment need to have been active in applied research and/or in professional practice (if not active currently) and to value these activities. Undoubtedly, reading up on topics in preparation for teaching (particularly at advanced levels) is not the same as actually having been through a similar or parallel process in research or practice. Ideally, in the past, staff would have been involved in teaching and research or practice (possibly all three), with the opportunity to block or focus time, e.g. through sabbaticals. Within UoG, where possible, new staff with an explicit research function have normally done some teaching. Staff with past or current experience as practitioners, e.g. in Landscape Architecture practice, are normally involved in explicitly vocational courses and the natural links with teaching delivery can be inherently stronger (cf. applied research). New staff with a significant teaching function are normally research active at least at point of entry. Maintaining the strength of that research activity after exploiting the fat of the PhD can

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be challenging unless research is explicitly applied, externally funded and staff motivation is high. Attracting high quality teachers who are also high quality researchers to institutions where teaching dominates is likely to be challenging within present strategic climates for the development of activities within HE.

Principle 2:

Teaching/research links are important in terms of the quality of the learning environment for both the student and the learning facilitator. As such, these links should be actively encouraged and promoted among teachers who are active in applied research and/or practice. The relationship between high quality research and high quality teaching is notoriously complex as are the perceptions of different stakeholders. Academics inevitably engage in the learning process with personal intellectual baggage on the relationship of research and teaching that may impact positively or otherwise, on the student learning experience. The relative status/kudos of research and teaching activity are areas of continued debate nationally and institutionally. The links between high quality research and high quality teaching should be key elements of debate in strategic planning in course development. There may be a tension here with courses that may be inevitably market driven.

Principle 3:

Make positive use of teaching, research and practice links to encourage active learning. Improved links between teaching, research and practice can benefit the student when integrated effectively with different modes of engagement. The links do not of themselves create a positive learning environment. Applied research-based and practice-based learning lend themselves to active problem-based approaches to learning, encouraging flexible and lateral thinking skills of benefit to student learning and the workplace. Scenario A might be where the teaching and learning mode is a traditional research-based lecture delivered to a passive student group; Scenario B might be to submerge the students in groups in a

problem-solving context and to gear the learning process to mimic the research process to an assessed outcome. The latter might be a consultancy report to develop skills in writing for different audiences. There is considerable potential to use the actual process of research or practice-based activity (whether by shadowing, mimicry or simulation) to make the student learning experience more active. Experimentation by tutors concerning factors that allow an increase in the quality of the students' learning experience is important in maximising the benefits of the teaching-research nexus.

Principle 4:

Facilitate staff reflection on the links, whether between applied research and teaching, practice and teaching, or applied research, practice and teaching. This reflection should not be left as an optional extra, squeezed in within an already packed academic year. To maximise the benefits of applied research, practice and teaching taking place in the same organisation, staff need to see their academic portfolio (past and present) and the portfolios of their colleagues as an integrated whole. Sharing and dissemination of good practice with colleagues, internal and external to the institution, should be encouraged (see the LINK Teaching Research Portfolio). There is no time in higher education for wheels to be re-invented.

Principle 5:

Regularly evaluate departmental (and institutional) strategies to optimise synergies between teaching, research and practice. Past experience also indicates that if the relationship between teaching and research and/ or practice is to be optimised to maximise the benefit to the learner and the learning environment, it needs to be strategically planned for and nurtured at all levels. Departments (and institutions) need to think through clearly their stance on research-practice links within the student learning environment. This can happen proactively in a variety of ways which include: constructing opportunities for debating and sharing of good and innovative practice within and across departments; systematically involving learning models that integrate research and

practice-based activity across taught programmes as a key part of course ethos.

Principle 6:

Make staff research and practice-based activity accessible to students. Tried and tested academic media can be used with a new slant to aid the process, along with more innovative approaches. The traditional vehicle for informal research debate, the departmental seminar programme, provides an excellent opportunity for staff and students to engage with the links between teaching, research and practice and good research/teaching links can be established in the programme design. It is important to target explicit sessions that demonstrate the links between teaching and research, or teaching and practice, where students can actively participate in discussions in an environment of healthy debate. This includes the opportunity for student exposure to the research and practice activity of external visitors to the institution and involves targeting and actively promoting seminars explicitly for students so that they do not feel intimidated in attending. More innovative models that involve active student engagement include student journals, for publishing their dissertation outputs, and student conferences where student research findings are presented and discussed.

Physical accessibility of research-active staff within term is a further issue. Historically, this engagement was inevitably curtailed by individual research commitments that might be difficult to juggle around teaching. The importance of blocking staff time for activities was emphasised and where possible, integrating research/teaching activities for the mutual benefit of researcher and student. Blended learning opportunities, particularly those involving WebCT within UoG, now allow researchers and practitioners to engage with discussions with students beyond the conventions and timing of the classroom.

At the module level, the relationship of module content to research, consultancy or practice-based activity should not be taken as read for the student. Informal feedback indicates that undergraduate students may not be aware of individual or departmental staff research interests, particularly if there are

other research-active staff (cf. the teacher involved in delivery) that are active in the subject area. In UoG, one element introduced has been to indicate related research and consultancy expertise of staff in course booklets/ module guides with follow-up references e.g. to Web site profiles, projects, publications etc. There is still more that can be done to increase the information exchange to students throughout the period of their engagement with the HEI.

Principle 7:

Strengthen student involvement in 'Real' project work. Research-active staff should appraise where there is potential for useful links. This could be whether establishing a pilot project (see Hunt's contribution to the LINK Teaching Resource Portfolio), through use of materials after the actual project for the client/ funder is complete, or the opportunity for students to carry out shadowing during the project. There were differences in opinion among the project team as to the whether the use of materials afterwards really engages the student (c.f. actual involvement/ shadowing in the research process). There is the potential to involve students in actual or simulated project work (see LINK Teaching Resource Portfolio contributions by McAllistair and McEwen), particularly where electronic and hardcopy resources have already been drawn together for research contracts (N.B. check for intellectual property right or data protection issues here). This allows the student to evaluate, for example, elements of science or design that are required in specific environmental management problems or in urban development (e.g. Sustainable Urban Drainage Systems or SUDS). The obvious extension of this is to design a whole programme or its core elements (cf. a module) around inquiry-based learning linked to departmental research specialisms.

Principle 8:

Maximise the benefit of existing external links to research/practice environments to student learning. The involvement of external organisational links and personal contacts gained through applied research and practice can add reality to teaching and

learning and approaches that simulate applied research or practice-informed learning activities. Benefits to students are numerous including the development of personal as well as subject-specific skills and notions of transferred experience (see McEwen et al., 2003 for benefits and pitfalls). The involvement of external users of applied research or practitioners in simulated project work is demonstrated in the four Teaching Resource Portfolio scenarios contributed by the LINK project at UoG (see end of article for details). Alumni in research and practice also act as an important formal and informal resource to be tapped as excellent role models for current students and individuals, with sympathy to approaches from current students for information etc. External organisations are normally keen to be involved in steering topics for student project work. Care has to be taken with quality assurance of projects. Free research or practice-based work may have to come with a health warning! The student learning experience can benefit, for example, from insight into how different disciplines, professions and organisations approach similar development problems.

Principle 9:

Maximise shared resources for teaching, applied research and investment in practice. Where possible, resources gained through contract research should be made accessible to students. From a pragmatic perspective, the resources compiled to support a research or practice-based project can reap significant return for the student both in terms of the critical mass of material marshalled on a particular topic but also in shadowing the process of drawing together and synthesising evidence as well as reviewing gaps. Research activity has potential indirect benefits in terms of resources for teaching that are sometimes not realised. Documents purchased out of external research funds do not always find their way to Learning Centres. In the context of finite resources, this is a missed opportunity, particularly if corporate materials then sit on individuals' shelves. UoG is working to heighten awareness of research and practice-related research resources (mainly through seminar promotion and

detailed in course booklets) to other staff and students.

Principle 10:

Target areas of the curriculum where the educational benefits of the links have the potential to be greatest. One such area is research methods training. Frequently the best conveyers of research methods training are those who are experienced practitioners in this area, provided they have the appropriate pedagogic skills. It is possible for investigative methods modules at undergraduate and postgraduate level (preparation for the dissertation or Masters thesis) to have an indication of in-house researcher expertise, with methods and examples of their application. Another area where the accessibility of staff research expertise should be ensured to maximise research-teaching links is in project and dissertation supervision. Undergraduate and postgraduate projects have the potential to capitalise on research and consultancy activity but this potential is not always realised for a variety of reasons. These include lack of information flow, lack of staff time and problems in matching topics to staffing expertise. The knowledge and capability are there but the best staff to supervise in terms of the subject realm are often inaccessible for some reason (this can happen, for example, by using a model of staff allocation to project supervision that prioritises generic supervisory skills over specific subject knowledge). With planning, there is strong potential to work to overcome these issues to capitalise on student activity, for example, on pilot projects including external partners.

Principle 11:

Encourage active student involvement in the debate on teaching/research/practice links. Informal feedback indicates that students like to read articles written by their tutors. They check potential tutors' publications out on the 'Web of Knowledge'. Feedback indicates staff expertise and research/practice experience can be influential factors in a student's selection of institution, particularly at postgraduate level. Feedback on undergraduate and postgraduate student perceptions of the transparency and desirability of links between teaching, applied

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research and practice, can help identify areas where further effort can reap return for all stakeholders. Some module evaluations now have a question to students on the evidence/value of teaching, research and practitioner links in terms of the quality of the learning environment. At UoG, appraisal of these links forms part of annual academic planning discussions within postgraduate course boards that could be beneficially extended to undergraduate level.

Principle 12:

Capitalise on the projects in applied research and practice that motivate and enthuse staff. Staff enthusiasm for their research or practice-based activity can be contagious and normally secures some sort of reaction (hopefully positive!) from students. This freshness, immediacy, energy and excitement need to be conveyed to the learning process.

CONCLUSIONS

An evaluation of links between teaching, applied research and practice does not take place in a vacuum. National and institutional policy inevitably dictates the ease that these links can be made across the sector. However, even in more challenging environments, the outcomes of pedagogic research projects such as the LINK project can help encourage

good practice and different ways of thinking about teaching, research and practice links within and across disciplines. While the importance of links between teaching and research and/or practice has been strongly argued from the perspective of the individual staff portfolio, much more needs to be done to implement strategies that capitalise on, and strengthen, the synergies between teaching and research/practice to the explicit benefit of the student learning environment. In the move towards more active approaches to teaching and learning, there can be no doubt that the exploitation of the links between teaching and research and practice-based activity should be capitalised on. Action points to capitalise on the research-teaching nexus within UoG have been identified so that tangible outcomes to optimise the benefit of all stakeholders can be achieved over short and longer timescales. Reflection, self-criticism and sharing of practice, facilitated by projects like LINK, are essential staff development tools in this process.

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Introduction

Research led teaching has recently attracted a lot of attention. This article examines the relationship between research and teaching in Higher Education and what it can add to the student learning experience in two modules being conducted at Napier University, one undergraduate, the other post graduate.

Literature review

Reviewing the body of literature currently available, it is evident that the connection between research led teaching and high quality learning experiences is not self evident and relies on a synergistic relationship developing around scholarship. Boyer et.al's (1990,1994) investigation has been seminal in developing the notion of scholarship as a complementary and interactive means by which learning is able to bridge the gaps between teaching and research. In the scholarship model, teaching and research are linked together because they are not only seen to be complementary, or interactive, but also synergistic in advancing knowledge and progressing understanding (see, Newmann, 1994; Brew and Boud, 1995). Hattie and Marsh (1996), also confirm the need for this link to be based on scholarship, suggesting that it is the pedagogy of research led teaching which allows teaching and research to be connected with one another in the process of learning (see, also Brew, 1999). It is, however, noticeable that Gibbs' (2002) examination of research led teaching, suggests the scholarship, complementarity and interaction, needed to develop such synergy is lacking in UK Higher Education. Gibbs (2002) argues that if the value of linking research and teaching, under the auspices of research led teaching, is to be seen as something which is worthwhile, it needs to forge a stronger connection with learning.

Valuing the link, making the connection worthwhile

While educational experts may see the value of such pedagogy, academic staff cannot automatically assume students see the merit of linking research and teaching, or that the connections which are made between them are worthwhile in terms of the effect research

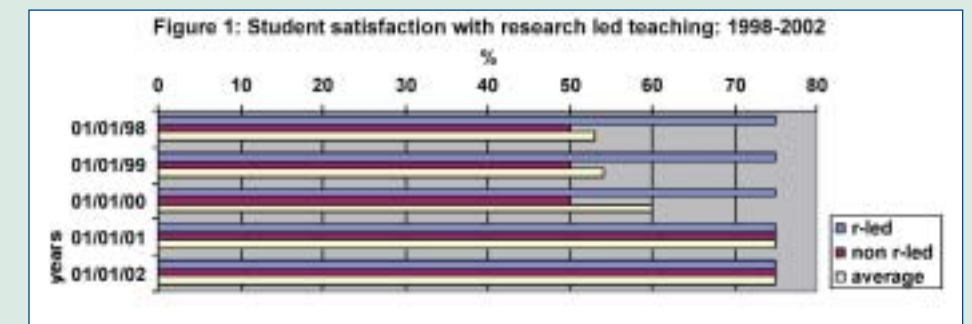
Valuing the link between research, teaching and learning: MAKING THE CONNECTION WORTHWHILE

led teaching has upon learning. Given that the scholarship model of teaching and learning acknowledges there is no automatic value to be derived from linking teaching with research, or that this is in anyway self evident, it is perhaps the students' experience of research led teaching which ought to be seen as providing the acid test of its worth. It is the practical realities of the students' learning experiences to which this article draws particular attention.

The scholarship approach to research led teaching

It is the 'scholarship' approach to research led teaching that has been adopted by the School of the Built Environment at Napier to improve the quality of learning. Quality enhancement has been evidenced through a survey of student learning experiences on two research led modules for Building and Surveying related subjects at under and post graduate levels. The modules in question are:

- Planning and Development (an undergraduate level 4 module)
- Property Asset Management (a postgraduate level 7 module)



- Property Asset Management (a postgraduate level 7 module)

Table 1 outlines the research led teaching strategies adopted for the modules:

The practical realities of the students' learning experiences

The practical realities of students' experiences are based on a review of data drawn from two sources: questionnaires returned on both of the aforementioned research led teaching modules between 1997-2002 and interviews carried out with students connected with the respective 'blocks of learning' during 2002/2003.

TABLE 1: RESEARCH LED TEACHING STRATEGIES

PLANNING & DEVELOPMENT (LEVEL 4)	PROPERTY ASSET MANAGEMENT (LEVEL 7)
Research based teaching material provided by academic staff	Research based teaching material provided by academic staff
In-depth case study examples provided by external experts	In depth case studies provided by external experts and forming loosely structured coursework assessments, aimed at data collection and synthesis through complex analysis, problem solving and critical evaluation
Individual student led seminars, requiring data collection, complex analysis aimed at problem solving, critical evaluation and synthesis	Individual student led seminars
Group based seminars requiring the aforesaid critical review of the research forming the basis of the teaching material and reflection on the learning experiences	Group based reflection on learning outcomes, subject based knowledge and understanding
Class based reflection on learning outcomes, subject based knowledge and understanding	

Figure 1 shows that over the past five years, students have been approximately 75 - 80% satisfied with research led teaching modules. Viewed against an index of all other modules on the two programmes, it is noticeable that the students' experience of research led teaching is something which is perceived to be only slightly more satisfactory than other modules for 1998/99 and 2000-2002. Whilst this merely suggests that the students' experience of research led teaching is satisfactory and not 'out-of-line' with taught modules of a more traditional type, it cannot indicate whether the value of linking research and teaching has any particular weight, or what bearing this in turn has upon learning.

Clearly the questionnaire returns are too crude a measure to indicate the particular weight students put on research led teaching and what bearing it has on learning. This is therefore the object of student interviews. These have been carried out as part of a module review process and take the form of semi-structured interviews and the information gained from these exchanges is qualitative in nature.

Table 2 overleaf provides a summary of the interview information obtained. It divides the students' experiences of research led teaching into three columns: skills, learning outcomes

➔ continued overleaf

TABLE 2: STUDENT EXPERIENCE OF RESEARCH LED TEACHING

	SKILLS	LEARNING OUTCOMES	KNOWLEDGE & UNDERSTANDING
HIGH	data collection, complex analysis aimed at problem solving, critical evaluation and synthesis and reflection	technical, procedural, theoretical, practical and research led	subject based, transferable and life long
MIDDLE	data collection, complex analysis aimed at advanced problem solving and critical evaluation	technical, procedural theoretical and practical	subject based and transferable
LOW	data collection, complex analysis	technical, procedural and theoretical	subject based

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and knowledge & understanding. They are measured in terms of how they cut across three levels of experience: low, middle and high. This framework is designed to gather information on the transformation of student learning resulting from the 'typical' experiences of high, middle and low quality research led teaching.

From Table 2, it is clear that the lowest level of value which students place on the link between research and teaching is data collection and complex analysis. This in turn is seen as worthwhile because such learning experiences meet the technical, procedural and theoretical learning outcomes of subject based knowledge and understanding. Leading on from this, research led teaching is also seen to provide a positive learning experience because it helps with the development of advanced problem solving and critical analysis, itself providing a route to high level skills development in synthesis and reflection. This is significant in that such skills provide evidence of technical, procedural, theoretical and practical learning outcomes, which are not taught, but research led. Together this combination of skills is seen to be progressive because they develop a level of knowledge and understanding that is not only subject based or transferable, but life long in terms of attributes they engender in graduates.

Reflecting on students' comments, the following is evident:

- students value the link between research and teaching, seeing the relationship as worthwhile because it allows them to participate in a meaningful exchange of learning experiences.
- as much of the research is student led, the 'teaching' is seen as valuable for the dialogue that develops from the learning experiences and worthwhile because of the

equal measures of mutual respect and trust, which forms between both staff and students.

- research led teaching also allows connections to be made that not only rely on an exchange of ideas, or open dialogue between staff and students, but a level of engagement which in turn leads to the development of the skills needed to undertake complex analysis, aimed at advanced problem solving and critical evaluation.
- the weight attributed to high and middle range student experiences of research led teaching is associated with the constructive alignment of what is 'taught' (either by the staff or students) and assessed (in terms of in-depth case studies forming the basis of exams and coursework). This in turn has a bearing on what is learnt (as evidenced through individual, group and class based seminars on subject related matters) and whether the said learning experience is seen to be worthwhile.
- evidence exists to suggest that students with high level experiences see research led teaching as a learning experience which provides the transferable skills needed to tackle other, more heavily weighted student led modules (for example, the research methodology and dissertation modules). To a lesser extent, some students also see this type of learning as not only developing the

required transferable skills, but life long learning skills needed by them as graduates.

- aside from those students achieving high levels of skill development, knowledge and understanding; similar, if not more limited benefits, are also recognised as having a bearing on those whose experience of research led teaching is of either middle, or low quality learning.

CONCLUSION

Research led teaching places particular weight on a meaningful exchange of ideas between staff and students and open dialogue based on equal measures of mutual respect and trust in the learning process. Furthermore, it is evident that the students' experience of the research led teaching outlined in this article is both positive and progressive. The evidence set out suggests that research led teaching provides a learning experience which students value and see as worthwhile. This is not only because the link between research and teaching adds particular weight to their learning, but also for the reason that the connection which this forges between them, also has a bearing on the quality of the learning students in turn experience.

With research led teaching, learning is no longer seen as a passive activity, but an active process of 'learning by doing'. The experience is such that students tend to develop a view of learning as something which is highly iterative, where subjects are critically reviewed, reflected upon and constantly redefined in the interests of advancing knowledge and obtaining a greater degree of understanding.

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TEAMWORKING SPECIAL INTEREST GROUP

Over the last four years, CEBE has funded a series of Special Interest Groups to research and report on specific learning and teaching issues. The following Teamworking overview and selection of exemplar papers has been compiled by Jaki Howes, project leader for the Teamworking SIG group.

Background

Teamwork occurs in most disciplines as a key skill. Inter-disciplinary teamwork between design and construction related disciplines however is rare. There are all manner of reasons for not promoting teamworking but those that are practical can be surmountable with enthusiasm. Some of the difficulties lie in academic perceptions of mutual 'pollution' between creative ('arty-farty') designers and logical ('blinkered') builders, cumbersome assessment systems and simple lack of time.

In practice, traditional contracts are often confrontational. Architects are blamed for being unrealistic, for late drawings and for being arrogant. Builders are blamed for cutting corners, shoddy workmanship and for being solely profit motivated. Quantity Surveyors fire the confrontation and the client suffers. Teamwork is thus very important. Since the 1988 Construction Task force, led by Sir John Egan, published the Rethinking Construction report, a rapidly increasing proportion of building contracts are now 'partnered'. This means that the clients, designers, consultants and contractors work together from the outset of a project. Responsibility is shared.

The way that designers are taught is fundamentally different from students on construction courses. The studio culture experienced by designers encourages experiment, whimsy and individuality. 'People' issues are high priority. Frequently cost and 'buildability' take third place. Construction courses on the other hand are about problem solving and getting a 'right' solution at the first attempt. The vocabulary used is the same but the words have different meanings to different professions. These are generalisations, but reflect general attitudes. If these students are to work more closely together when they qualify, should they be taught together at university?

I convened a special interest group, funded by CEBE, to investigate team working where architects work with other disciplines. I consulted the 2000 UCAS handbook to determine where it was possible to educate architects and 'builders' together. Forty-four institutions ran architecture-related courses, whether recognised by the ARB/RIBA or not. Of these, eight ran courses in Architectural Technology, eight in Building or Construction, twenty-two in Civil Engineering and fourteen in Quantity Surveying. Unfortunately, they were not in the same institutions. These figures are not now accurate, but served as a starting point. Leeds Metropolitan University

covered all four subject areas. Bolton Institute, Heriot-Watt University and the London South Bank University, covered three. Another seven institutions covered two. This is clearly a problem, as the possibilities for architects getting involved in interdisciplinary or multidisciplinary teamwork are limited. In consultation, a list of possible participants was assembled who were invited to a meeting at Leeds Metropolitan in March 2002. There were two subsequent meetings. The barriers identified during discussion were:

- **ACADEMIC MATTERS**
absence of suitable courses
timetables and co-ordination
staffing
hostility from professional staff
parity of assessment
enforcement of student participation
- **PROFESSIONAL INSTITUTIONS**
rules about assessment

The following short descriptions illustrate how a selection of institutions who participated in the SIG group are involved in teamwork:

London South Bank University (Tony Morgan, retired)

Tony Morgan was involved in teamworking in the 1960s, and has experienced all the difficulties and ways of overcoming them. In his paper, 'Learning through projects', first published in Studies in Higher Education Vol.1 No.1, 1976, it was shown that projects were successful when there was a committed nucleus of teachers. Architects worked with built environment and environmental science students and it became apparent that three-day exercises were the easiest things to organise. The quality of architecture was not always good but people saw the relevance. The paper illustrates how the problems encountered facilitating teamwork have not changed.



Image of student making interdisciplinary project presentation supplied by Bolton Institute. Reproduced with kind permission.

Glasgow Macintosh

(Ken Macrae)

Every year, all Year 3 architecture students take part in the 'INTERACT' competition (see below). There are no building courses at the Macintosh School so there is collaboration with two other institutions. There are 60 or 70 teams of three, composed of an architect, an engineer from either the University of Glasgow or the University of Paisley and a quantity surveyor from Glasgow Caledonian University. The issue of not having a full range of disciplines in a single institution has been overcome.

Leeds Metropolitan

(Jaki Howes)

From 1998 to 2001 Jaki Howes ran the TIME IT project, an M4I Demonstration Project, (see page 30). This was an experiment in multidisciplinary working which attempted to overcome adversarial attitudes, encourage innovative methods of working and was based on the use of IT. Four teams of four students from architecture, civil engineering, construction management and quantity surveying, worked on projects devised by six industrial collaborators, for an average of a day a week, over a five week period. The students were encouraged to use IT as much as possible and were self-selected so there were no problems with participation. The project was enabled due to the design and construction disciplines being co-located in the same building.

Leeds Metropolitan

(John Harrington & Lindsay Smayles)

The Built Environment students (Building Surveyors, Quantity Surveyors, Construction Managers, Property Managers, Civil Engineers and Planners) work in groups at Level 1 to find out about buildings. There is an interdisciplinary project at Level 2. In Level 3, there is a module for inter-professional studies in which Architecture students (in a different school) were involved for the first time in 2002. Some problems were experienced with participation and a number of difficulties became apparent.

Bolton Institute

(Roger Seeds)

Projects are seen as an important part of all the degree programmes at Bolton. Minor amendments will be made in the near future so that students from the BSc (Hons) Civil Engineering degree will also be involved in interdisciplinary project work at Level 3. This is a half module and currently consists of eight teams of four, each containing an architectural technologist, building surveyor, construction manager and quantity surveyor. There are no architects or designers at Bolton. There used to be more projects at other levels.

Anglia Polytechnic University

(Ian Frame)

Design and construction students work together for 12 weeks on an interdisciplinary design module. Students engage in design activities that

introduce a different environmental aspect for the first six weeks of the module. A group strategy is devised and a plan of action is implemented to ensure that all members combine to produce a single solution by an agreed deadline.

University of Greenwich

(Tony Cleford)

For the last four years, multidisciplinary teamwork has happened between full time and part time students on the BA architecture and BA landscape architecture course. There are no construction students. BA Garden Design students have also been involved in previous years. Due to the full time/part time mix, the course is catering for level 2 and level 3 students. For half the project, teams (different sizes, backgrounds, professional interests, not self-selected) study the design and construction team behind a given project. They look at how that project team worked and how the project was managed and delivered. For the other half of the assignment, students assess how the team of which they are part is working. Tony Cleford is the only member of staff involved in the project.

University of Central England

(Anne Hill)

Due to the fact that there are design and construction disciplines at UCE, the former Dean introduced many interdisciplinary working and common modules. The students unfortunately hated it and there was a crisis with recruitment. Links are now being rebuilt.

University of the West of England

(Richard Parnaby)

Architecture and Planning is a joint course at UWE. Several modules are taught jointly with other built environment disciplines. Teamwork has been going on for over six years. Students of most faculty undergraduate awards (Architecture & Planning, Planning (four awards), Real Estate, Building Surveying, Quantity Surveying etc) are involved in teamwork in a series of three inter-professional modules in each of the three years of courses (the first three years for four year courses).

Level one is an exploration of the process of development. Level two is an urban regeneration design project. At level three, the focus is issue based with students working in teams to prepare a presentation. In the first 'round', teams present to an audience of their peers. The winners present to visiting sixth formers at the annual Dean's Conference.

University of Cambridge

(Paul Kirby)

The part-time masters in interdisciplinary working at Cambridge was set up by the Arup Foundation in 1998. It is a post graduate course for those with a few years experience of working in the real world. The majority of students are drawn from the principal built environment disciplines: engineering (civil, structural, building services and transport), architecture, quantity surveying, building

surveying and construction. A small number of students are also accepted from different backgrounds. This course has the advantage that its participants are qualified and there by choice rather than compulsion.

Coming from professions with different aims and value systems, the students provide a valuable outsider viewpoint that provides a check to the sometimes cosy hermetic thinking of industry insiders. The course is part time, running parallel with the students' working life. It offers seven, week long, residential study sessions spread over two years. During most of these sessions a design exercise is set, with the students being formed, typically, into four person design groups. The intention is that each group contains a mix of disciplines reflecting a real world design team. The design tasks range in scale from the design of a facade system to the planning of a new settlement.

Sheffield Hallam University

(Anne Oxley)

'Better Together' is a three year project funded through HEFCE's Fund for the Development of Teaching and Learning (FDTL Phase 3). It grew out of recognition of the need for an inter-professional curriculum in response to the growing evidence of collaborative partnerships in practice. The project is a collaboration between Sheffield Hallam University, Oxford Brookes University and Kingston University. All

the findings and a comprehensive set of case studies are available on the project website at www.bettertogether.ac.uk.

One of the outcomes of this special interest group is that the topic of teamwork has been taken up by ACBEE (Accelerating Change in the Built Environment). This is a body that was set up in November 2002 by CEBE and the CITB, with support from Rethinking Construction. ACBEE is looking for examples of good practice in construction education. For further information on ACBEE, please see page 4 or visit the CEBE website at www.cebe.ltsn.ac.uk.

CEBE would like anyone who is running successful teamwork to make contact with the Centre

Jaki Howes

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THE INTERACT STUDENT COMPETITION

Ken Macrae

Mackintosh School of Architecture, Glasgow School of Art

At undergraduate level, the separate teaching of architecture, structural engineering and quantity surveying is the norm in the UK, its historical basis embedded in the formation of the professional institutions in the 19th century. These separations created schisms which fostered ignorance and fuelled prejudices within the construction industry.

In an initiative to dissipate inter-industry prejudices, the **Interact '89** competition was established in 1988 for student architects, engineers and quantity surveyors. The three members comprising the design team had little or no previous exposure to an inter-disciplinary working regime. A collective design solution was provided to a client brief and each team member gained

a better understanding of their respective professions through observation of their colleagues' reasoning and decision making processes. The final was held in March '89, when six teams made audio-visual presentations of their projects to an independent panel of judges representing each of the three disciplines.

In 1989 the competition's relevance to the contemporary construction industry was affirmed when Interact '89, won the Taylor Woodrow Prize for Higher Education in the Construction Industry, as part of the UK Partnership Awards Scheme. In 1993, the competition became international.

Interact is now regarded as a significant educational benefit and means of

promoting effective interdisciplinary working relationships. It is one of Scotland's longest-established construction industry student competitions.

THE INTERACTION PROCESS

Since 1995, the design teams of students have been formed from the Mackintosh School of Architecture (3rd Year), University of Paisley Department of Civil, Structural and Environmental Engineering (4th Year) and Glasgow Caledonian University's Department of Building and Surveying (4th Year). Prior to 1995, the students of engineering were from Strathclyde University's School of Structural & Civil Engineering. Since 2000, students of engineering (3rd Year) from the University of Glasgow's Department of Civil Engineering have taken part.

Running a competition of the calibre of Interact requires considerable commitment by the four educational institutions involved in setting up the inter-institution relationships. Possibly the greatest challenge arises in co-ordination of timetables, as well as finding space for both student and staff interaction to take place and including it in the curriculum of each institution. It is a constantly developing programme, with every year raising new variants, problems and solutions.

TEAM FORMATION

Team formation in the first five years of Interact was a selection process by the academic staff of the schools involved. In the first year this was random, followed by seeding on academic merit. This gave rise to

clashes of personalities that caused serious rifts and in some cases the collapse of allocated team groupings. Action had to be taken by the tutors involved to create a less controlled approach, and allow a more empowered process for the students. Since 1995, teams have been formed by a self-selection procedure that has effectively allayed this problem. The process involves a deceptively simple process whereby the student architects, who have been examining the brief for two to three weeks, display their initial thoughts, as sketches and models, for the student engineers and quantity surveyors, to open up a 'trading fair' of up to 150 students from the three cognate professions. Despite initial anxieties and opening night

➡ continued overleaf

➔ continued from page 27

nerves from some students, the teaming up takes place within an hour!

The responsibility for the interaction, on a day to day basis after the teams are formed, lies collectively and individually with the team members, with the key to success lying in the management and communication processes, visual, verbal and written, which are recorded in the Interact Diary. This becomes a vital component in the assessment of team interaction performance, their reasoning and decision making processes.

TEAM DYNAMICS, SYNERGY & PERSONALITIES

It was observed by academic staff that some teams were able to function more quickly and effectively than others. As team performance is a key aspect of Interact, it was desirable to introduce some input in team dynamics to help the participants understand that this is an essential part of the whole learning experience.

As a response, Bruce Nicol, a management consultant, was introduced to make a presentation immediately prior to the teaming up, on the classic stages in team formation, after Tuckman (1965), of forming, storming, norming and performing. Bruce used extracts from Lumet's (1957) film '12 Angry Men', set in the jury room of a murder trial, to illustrate the four stages in reaching consensus. Student responses to this input have been highly positive, with the recognition that an effective team is something that has to be worked at.

THE REVIEW OF PROGRESS IN THE INTEGRATED STUDIO

The tutoring of the student participants with respect to their individual discipline and academic marking remains clearly with respective academic staff. However, twice during the interactive phase, time-tabled reviews of the Interact Teams' performance take place, when presentations are made to a panel of academic staff from each of the four participating institutions. The format has varied over the years, to its present state where for the first Team

Review, the teams present their combined efforts for a table-top discussion, in an integrated cross-discipline instruction session. It takes the form of an informal 'surgery' on the initial teamworking process and is designed to ensure that communication and collaboration is clear and that each team member is aware of their respective role and responsibilities. This has been found to be less intimidating than the 'crit' review, which although common to student architects, is much less familiar to student engineers and quantity surveyors. The procedure is vital for monitoring team progress and any problems arising from either the individual members or team communications. It is seen from the inter-institutional staff point of view as a time to encourage and support rather than expose to intense critical comment. It is also the opportunity to address the importance of team working and collaboration.

The second Team Review is more formal, with each team allocated a fixed period for their presentation. Assessment is made by a panel of academic staff with regard to team interaction, collaboration and presentation technique, both visual and verbal.

Both sessions are treated as workshops rather than critical reviews. Within the Mackintosh School of Architecture, this programme is unique in that regularly throughout the interaction process, emphasis is placed on team working, communication and collaboration rather than individual creativity, although not to its exclusion, by any member of the design team. To Third Year student architects, at this formative stage in their education, it is effective in exposing the reality that their designs have to be communicated to others and not only other architects.

PRESENTATION TECHNIQUE

An important aspect of Interact which was affecting team performance was highlighted in variable skill levels in presentation techniques at the second Team Reviews. The academic staff rectified this by introducing a seminar presentation and coaching sessions by Gordon Gibb, a practising architect and keen amateur

actor. Improvements were dramatic, with students responding to training by showing practical skills and self-confidence at the presentations.

ASSESSMENT AND PRESENTATION

Each of the four academic institutions is responsible for the first stage assessment of their respective students' submissions, independent of team interaction. The three discipline assessments are then collated, together with an assessment for interaction, based on the Interact Diary and on the team performance at the Second Team Review. From this, a decision is made on the finalists, now usually nine teams, who will make presentations to the independent judging panel at the Competition Final.

The final presentations to the judging panel take place before an audience, with each team making a strict 10 minute audio-visual delivery of their proposals and the design team process, using slides and overheads. Since last year, it has been exclusively PowerPoint. As part of their deliberations, the judges have access to an exhibition of drawings, models and reports by the teams, both before and after the audio-visual presentations. Decisions are made on the night. A winning team is announced and the judges make comment to the audience of their views, both general and particular, which are seen as a valuable contribution to the learning process and an experience for all student participants, not just the finalists.

At the launch of each year's Interact, the previous year's judges speak to the new student participants from all four institutions on the positive aspects of their experience to give some continuity to the programme.

DEALING WITH DESIGN CHANGES AND REFINEMENTS

One of the most frequent criticisms levelled at architects by engineers and quantity surveyors is that they can never make up their mind and are constantly, even habitually, changing their designs. Interact is no exception and this criticism is regularly raised. Architecture students are encouraged to present changes, which are vital for progress to take place, as

refinements and an essential part of the design process, which should include all members of the design team. They must also be made aware that badly presented refinements, wilful or radical design changes, are disruptive and create unnecessary additional work for their fellow team members. In order to prevent the engineers and quantity surveyors embarking on abortive work, a cut-off date is established beyond which no architectural design changes can be made.

THE INTERACT TEACHING MODEL AS A COLLABORATION GUIDE

Wright and Allen (1992) raised several criticisms of the Interact programme from the engineering viewpoint, which were effectively dealt with by Hardy and Wilson (1999). The major change arising from these discourses was with the academic assessment of the interaction, which could not be included in an individual student's academic grades, relying as it does on the performance, or lack of performance, of others. Interact has to be seen as highly important life and employment preparation skills and is recognised and valued by many potential employers. Past participants now hold senior positions in professional architectural, engineering and quantity surveying practices in Scotland and vouch for its relevance in their career development.

A criticism levied against the Interact programme by some architect staff members in the Mackintosh School of Architecture is that the best architectural scheme does not necessarily win Interact, which undoubtedly has been the case in some years. The point, of course, is that no matter how good an individual architectural design is, if it cannot be communicated to and subjected to scrutiny by cognate professionals, then the criticism has to be redirected against the prima-donna approach to design rather than the collaborative approach. Not only do we have to teach good designers to communicate, but we also need to teach good communicators to design.

LEARNING OUTCOMES AND THE WORLD OF WORK

The Interact model attempts to simulate the

world of work in that an interdisciplinary approach is required to meet client needs from understanding the brief, to jointly presenting in bidding for work, to successful project completion. No other part of the undergraduate student curriculum prepares them as realistically for the challenges with which they will be faced after graduation. Both clients and employers have increasingly higher expectations of 'soft

skill' levels in young professionals. The key learning outcomes from Interact seek to meet these expectations. Skills gained can include:

- Communication and interpersonal - including presentation skills
- Decision making and pro-activity
- Problem solving
- Team working
- Flexibility and adaptability

CONCLUSIONS

The experience, gained throughout the years of my involvement in Interact, has been most encouraging in allaying pre-judgements and dispelling some of the ignorance each discipline has of the others' education, training attitudes and aspirations. The student participants mature through the experience of collaborating, developing proposals and presenting as a team, in a highly relevant precursor to their future roles in the building industry. It begins to engage with the issues of collaboration brought into the public arena by Sir Michael Latham (1994) and Sir John Egan (1998) in their respective reports on the UK construction Industry.

From the point of view of the education of student architects, Interact deals with transferable skills described in the RIBA - ARB Criteria for Validation (1997), in particular the ability to work as part of a team. Architects need to understand what engineers do; engineers need to understand what architects do and they both need to understand the role of the quantity surveyor. They must communicate and work together, realising that successful projects are balanced, with everyone involved working as a team.

Paul Kirby puts it succinctly in Spence et al. (2001), when he points out that knowledge of the methods and priorities of other disciplines is not enough to ensure effective collaboration. What is equally important is a set of attitudes including generosity, curiosity and an ambition to work towards the best rather than the adequate.

- Based on a paper first published in the CIB W89 International Conference on Building Education and Research conference proceedings, Vol 3 pp1418, April 2003, Salford. Reproduced with kind permission.

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WORKING TOGETHER

by Jaki Howes

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A series of experimental projects in multi-disciplinary teamwork using information technology have taken place at Leeds Metropolitan University (LMU). The TIME-IT Project (Team-working in Multi-disciplinary Environments using Information Technology) was set up by staff from Civil Engineering, Construction Management, Quantity Surveying and Architecture. The aims were to identify breakdown in communications and time wasting in the design / construction process, monitor the effectiveness of non-traditional ways of working and the use of IT. Leeds Metropolitan University (LMU) is one of the few academic institutions in the UK where the full range of design and construction disciplines are taught. The schools of Art, Architecture and Design (AAD) and the Built Environment are both in the same faculty. Thus architecture, landscape architecture, interior design, construction and project management, building surveying, quantity surveying, civil and structural engineering, architectural technology and urban planning all occupy the same building.

The School of the Built Environment has a common modular framework where students are taught together. However, there was only one module per academic year where students participated in a common project. The School of Art, Architecture and Design's courses had neither a common framework nor common teaching. The courses that related to the design of buildings and landscape, despite a great deal of commonality in the taught material, had little contact with other built environment disciplines.

In setting up the TIME-IT project, the author sought the help of Gerard Wood, a quantity surveyor, who had completed the Interdisciplinary Design in the Built Environment Master of Studies course (IDBE) at Cambridge (see page 34). During the course, he had carried out a survey of

LMU and staff attitudes to multi-disciplinary working. He found that the major obstacles were staff relationships, faculty structures and resource pressures and the influence of external accrediting bodies. He helped to find like-minded staff in civil engineering and construction management for the TIME-IT project.

Potential industry collaborators were also approached and five internationally recognised firms became committed to the proposal. These were Abbey Holford Rowe (architects), Chapman Taylor (architects), Citex (project management & quantity surveying), Halifax plc and Willmott Dixon (contractors). From January 1998, the collaborators and the staff held monthly meetings to devise suitable projects and prepare material. Projects were to be based on work that had been or was about to be carried out by the collaborators so that useful comparisons could be made. Final year students from architecture, quantity surveying, civil engineering and construction/project management would work in teams of four and use IT as much as possible. Students would not be told how to work, would not be 'taught' anything and would be closely monitored. It was essential to produce a working environment equivalent to the state of the art in industry. The two architectural collaborators already worked exclusively with CAD, the quantity surveyors, project managers and contractors did not. The high profile of the collaborators was instrumental in persuading Autodesk to donate software and DELL computers, the hardware. LMU provided the business environment.

AT THE OUTSET: 1988-99

Four teams of four students from the final years of each discipline were asked to work together on the project, for one day per week. In anticipation of difficulties with assessment and perceived fairness, it was decided that apart

from the civil engineers, the students should not be assessed on the quality of the outcomes, the 'product', but rather on their ability to monitor and assess the 'process'. The evaluation of the process would become the dissertation subject for the construction managers and quantity surveyors, the interdisciplinary option for the project managers, the special study for second year graduate diploma architects and the option for the first year graduate diploma architects. As LMU did not have a course in Building Services, Leeds College of Building (LCB) participated. Staff were enthusiastic, but there were difficulties. The LCB students were at HND level and were undertaking part time in-service training.

The first project, devised by Willmott Dixon, was based on a recently completed housing scheme. The students were provided with a site plan in electronic form and architect's plans of the house types required. They were to work on the project, one day a week, for five weeks to produce brochures that would contain layouts and perspectives of the scheme, costing analysis, full design and construction schedules, including calculations for the roads and drainage. The proposals were to be evaluated and compared against the 'real' solution in terms of quality of design and value for money. The second project was the design of a pedestrian bridge over an urban motorway, as a landmark for the Halifax. Again, this would last five working days, during which time teams had to produce a powerpoint presentation with full visualisation, calculations, costs and construction schedules. Project three was a three-day scheme for CITEK, based on proposals for the commercial development of a brown field site in Leeds, again with a final powerpoint presentation. The fourth project, which was for seven working days, took place in the second semester. It was based on the refit of



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an eighteenth century building, which was subject to a change of use, from a restaurant to a health club with swimming pool. The conversion to a restaurant was a completed scheme by Chapman Taylor. The final project, devised by Abbey Hanson Rowe, was the design of a flat-packed dwelling, which could be manufactured in Leeds and then used in a range of climates for relief housing. The work was to be a set of non-verbal assembly instructions that were to be deposited on the server for assessment by the architectural collaborators and an electronic report on logistics and cost.

At the end of each working day, students were asked to fill in a questionnaire that monitored and assessed their attitude to professional roles and the relative contribution of team members. At the end of four of the projects, students were asked to complete a summary questionnaire.

Projects 1, 2 and 3 (two lasting five weeks and one three) were carried out in the first semester and Project 4 (10 weeks) in the second semester. For the latter, the teams were changed. A completely new set of architecture students, drawn from the first year of the graduate diploma came in. The other built environment students had the option of whether to stay or leave the project at this stage. In the event, three of the four quantity surveyors and civil engineers stayed. Only one construction manager remained. Three new project managers joined. In addition, no student was

allowed to remain in the same group with anyone with whom they had worked before.

TEAMWORK AND ATTITUDES

In the first project, in three of the four teams, the construction managers took the lead. The Graduate Diploma 2 architecture students felt hampered by this, one commenting that 'if this is what it's going to be like in practice I don't want to be an architect'. The construction managers felt they 'knew' about housing because they had done it in practice. The students had become highly competitive within each team and produced far more work than had been expected.

In the second bridge project, the intensity of the competition increased and discord set in. The architects united with the civil engineers in their opinion that quantity surveyors were unimaginative, boring and superfluous - 'if it's not in Spons they don't want to know'. The construction managers kept their heads down because they knew less about bridges than housing. Despite threats of homicide and retribution during the project, all teams managed to present a picture of harmony, confidence and competence to the collaborators and staff at the final presentation. This project was the most successful in terms of innovative design.

For the third 'commercial redevelopment' project, the quantity surveyors were instructed to take a lead. They found this difficult and waited for ideas from the architects, who, in

turn were having difficulty being realistic. In two groups, the quantity surveyor and the construction manager did the bulk of the work. The final presentations were considered to be 'slick and professional' and commercially realistic. However, the quality of the architecture was mediocre, and, for the first time in the overall programme, the graduate diploma course leader expressed concern that the work of the architecture students was not of an appropriate standard for the course. Overall, IT was used in a piecemeal way, with each discipline working separately and often at home. File management was chaotic.

A change of team make up in the second semester gave rise to a complete change of atmosphere. The self-selected new students knew what to expect, were willing to work together and to experiment. The IT Manager from Chapman Taylor gave instructions about data structure and use of software became more co-ordinated. At the interim presentation, the staff and collaborators were impressed by the professionalism of the delivery. The powerpoint presentations and two of the animations were considered excellent. However, by the final presentation, the students were struggling to overcome technical difficulties caused by the huge files that architectural 'walk-throughs' generate. The building services engineers were only willing to act as consultants and to give single answers to specific problems. They were uncomfortable with the concept of working together on an equal basis.

The final project was run as a three day block. The time scale was so short that students had to undertake tasks that were usually carried out by other disciplines. Professional roles dissolved. It was a frenzy of activity and one computer for each team was not enough. The computer became the drawing board, notebook and meeting room. There was to be no 'verbal' presentation to the collaborators since the files were to be left on the server for 'remote' evaluation by the architectural collaborators. Feedback confirmed that both students and collaborators had missed the excitement and "buzz" of face-to-face assessment. In the end, the work produced proved to be over-complicated, lacking the hoped for 'invention' and had to be printed out to be understood, thus defeating a primary objective of the exercise.

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Over the course of the programme, the improvement in self-confidence, understanding and verbal presentation skills was remarkable. There was improvement in the inventive use of IT in the second semester. Although the range of projects had been devised so that if students maintained their professional roles, there would be an opportunity for each discipline to become a leader, in practice this did not happen. Student feedback suggested that leadership is 'more to do with personality than profession' (Howes and Wood, 2001).

1999-2000

There was rapid change in 1999. Two of the collaborating organisations were subject to mergers, two were subject to internal reorganisations, and all either upgraded their IT systems or introduced new ones. The representatives were still fully committed to the project but felt that they had to reduce their time contribution. The LMU staff felt the students had put in more time than the project demanded and that the number of projects should be reduced to four. The staff from the Graduate Diploma Architecture course felt there was insufficient architectural challenge, so it was decided to run the project with students from the final year of the degree. All projects were reduced to five weeks and the brown-field site was not used.

The quality of the outcomes were judged against a set of Key Performance Indicators adapted from those used by the Movement for Innovation, M4I. The latter was one of the organisations set up in response to the Egan (1988) Rethinking Construction Report with the object of identifying innovation in the construction industry. Project results were considerably better than in 1998-99 (the TIME-IT project was a demonstration project in the North East cluster of M4I from April 1999). There was much less apparent conflict within the teams although there was difficulty getting sufficient construction managers to participate. The blurring of roles was useful and clearly productive. Feedback from students was much more positive than in the previous year and there was a general feeling that 'everyone should do it'. This was verified by analysis of questionnaires.

2000-2001

It was touch and go whether the project would continue in the 2000/2001 session. Eventually, it was decided to run two projects in the second semester. The network was reconfigured as a

work group and an A3 printer, ZIP drive and CD writer were installed so that students could transport work between university and home. All the students that worked on the project were much more computer literate than in the previous two years. The students used the available IT resourcefully but struggled with the absence of internet access and the old-fashioned system. The final presentation to a wide range of collaborators was impressive despite the difficulties described.

USE OF IT

Throughout the project, each group of students was engaged in virtual prototyping. They were asked to produce clear and unambiguous visual information so that the 'clients' knew what they were going to get, a design and construction programme, a cost plan and appropriate structural calculations. In the first year, the tendency was for the students to produce a visualisation or animation. In the second year, they found this unnecessarily time consuming. The most successful projects were presented by photographed or drawn material that had been scanned. Plans and sections were simplified to suit a powerpoint presentation. The cost planning was done using spreadsheets rather than specialist software. 'Superproject' was used for the time planning. Structural calculations were done elsewhere on specialist software. Student teams used common data, stored in their project files on the server. These could be monitored externally but they were disorganised. The students learnt a lot about data handling, organisation and storage. The following year, a ZIP drive and a CD writer were installed. This meant that students could work from home and although they were working on the same project, they were not working together. They would have liked to be able to use e-mail and have internet access to improve communications. Over the three years, the most useful item of IT equipment was the mobile phone.



RESEARCH

The project could be seen as both a 'research' project, where students were being used as 'guinea pigs', or as a 'teaching' project. The project ran for three years and it is still difficult to identify anything other than trends. Issues such as the effect of the age, socio economic class, gender and charisma of the students have not been measured, but without doubt have a major influence on group dynamics and collaboration in the effective use of IT. We found that people enjoyed working in teams, that the 'architectural' quality of the solutions was diminished and that IT was useful, but of secondary importance. At the outset, it was decided to apply for research funding. In 1998, 'team work' and use of IT were buzz words. The collaborators were enthusiastic and were committed to an involvement for three years. They felt that the exercise would be beneficial to their organisations. In effect, we had an in-kind time contribution of £37,500, equipment of £25,000

and an annual cash contribution of £1,500. The author approached the LINK/IDAC programme that was jointly run, then, by DETR and EPSRC but this was unsuccessful.

CONCLUSIONS

There is movement towards teamwork in the construction industry. This is less obvious in education. Most academic institutions do not have both architecture and other built environment courses. This may be the root of the problem. Architects, landscape architects and interior designers are taught in a studio situation where experimentation is encouraged and self-expression and invention applauded. They expect this to be the case in practice, but clearly it is not. Built environment courses are rarely project based and the emphasis is on practicality rather than aesthetic quality.

In industry, the traditional procurement process has led to reinforcement of the opinion that architects have impractical ideas and the rest of the industry is primarily concerned with profit. The Rethinking Construction (see www.rethinkingconstruction.org.uk) Key Performance Indicators emphasise time, cost and the efficiency of the construction process rather than the quality of the finished building. Design Quality Indicators have been launched by the Construction Industry Council, but are not in general use. In addition, a survey (October 2002) by Databuild, for Rethinking Construction, indicated that only 10% of those surveyed had heard of Rethinking Construction, let alone become involved in it. This has to change. "By continuously improving its performance through the use of integrated teams, the industry will become more successful. This will in turn enable it to attract and retain the quality people it needs, which will enable it profitably to deliver products and services for its clients." (Accelerating Change, 12 Sept 2002)

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WORKING TOGETHER, LEARNING TOGETHER

Methods & Process in Multidisciplinary Group Projects

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Group projects can be mistrusted by both students and academics. Administration, organisation, timetabling and assessment can be difficult. Students and academics alike can often feel that the logistics and the problems of team work become such major factors as to sometimes cloud the real subjects of study. Yet team projects, particularly those involving multi-disciplinary teams, have a great deal to offer students, not least the experience itself. This is particularly true for courses in areas of design, where an individual's creative ideas have to be developed, presented, accepted and adopted by an extended team before they can be fully implemented. In these disciplines, the successful implementation demands the input of, and translation to and from, several other disciplines.

This pattern has its own variant in architecture. Whilst architectural education's main emphasis is usually on the quality of an individual's creative efforts, in architectural practice the emphasis is on the successful development and implementation of creative ideas by teams, including teams from different disciplines.

Background

The project at Greenwich has been in place for five years. It runs over one semester with a mixed cohort of level 2 architecture and landscape architecture students, full time and part-time, numbering approximately 100 in total. Designed as part of a replacement to a more traditional professional studies course,

the project was intended to help students learn about the context for practice in their areas, particularly focusing on how design ideas were realised through other people and other disciplines. If students are to be successful in their future careers, being successful in team work, it is bluntly pointed out to them, is unavoidable. The project asks students to research a particular project or practice, not from the point of view of what was produced, but how it was produced and who was involved in the process. They look for the teams behind projects and explore the ways in which designs were implemented. Students are asked to shift from looking at the individual commonly credited with the project idea to the team who implemented it. Collaboration, client and professional relationships, the impact of design decisions on procurement, construction, implementation and future proselytisation can all become significant issues and are often explored.

At the same time, the students are asked to monitor their own team's progress and working methods. They are asked to look for any elements in their project they can transfer to their own personal or team practice and to compare and contrast their team's working methods and performance with those found in the projects they are looking at. Consequently, demands for self-awareness and self-reflection are built in.

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The project ends with two collaborative outputs. The team makes a presentation to the year and submits a single team report that describes both their findings on the researched project and their own experiences of working together. Watching the presentations, students learn about different ways of implementing a project and working in a group. While student team experiences vary, their difficulties are usually common. These are addressed by a student-led question and answer session at the end of each presentation.

Teaching: Methods & Values

In developing and teaching this project, there is a clear belief in what management theorists have labelled 'the wisdom of teams'. Consequently, background teaching is, intentionally, limited. Architecture and landscape architecture students have a session on professional roles in construction and conventional ideas about teams. Over three weeks they also watch three hours of video tracking the construction of a major project. The art and design students had a session on team roles, following the research of Belbin.

All students have a session which explicitly, but



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simply, talks about how designers often work and, most important of all, how teams work in arts, design and construction. This specifically underlines how such teams can differ from much accepted management theory about teamwork. Student feedback suggests that this session is important. Not only does it establish the need to understand how particular professionals work at first hand, it also pre-empts some argument (eg about variations in team size). Randomly mixed student teams are then announced, following the principle that in practice you rarely get to choose all the people you work with. The only exception

to this has been to group part-time students into their own teams. Most student teams tend to be multi-disciplinary by the nature of this selection process. They also vary in age and previous experience.

Teams allocate themselves study subjects by drawing lots from a hidden short list. The short list is altered each year but is always diverse. The current list ranges from large-scale urban regeneration to Segal self-build projects, furniture design to landscape projects, competition-winning schemes by upstarts to the

modus operandi of major global practices, past and present.

Once the teams and subjects have been established, the inevitable student requests to switch teams, change subjects, exclude or include particular individuals on whatever grounds (attendance, age, language, domicile or sexual attractiveness) are all turned down. We think it's important that everyone is made aware from the start that there is no alternative to making their team work.

Teams are then given a date when they will have six minutes to present their findings to the rest of the year. Six minutes started as a logistics requirement to fit all the presentations into half a day, but has now become a key element. It forces teams to rehearse their presentations and edit them down for length. That means they must debate and decide what's important and what's left out. The rehearsal also means that everyone in the team sees the presentation. The time limit is audibly enforced with a beeping stopwatch. A little extra time is allowed if overruns are necessary, but most teams aim for the roar of admiration and triumph that greets a presentation that finishes smoothly and exactly at 5 minutes 59 seconds.

We ask each team to prepare sufficient copies of their report such that each team member

can keep a copy and one non-returnable copy can be submitted to the tutor. We think it's important that each team member has a concrete record of what the team achieved, for future reference, interviews and their portfolios.

No time is allocated anywhere on the student timetable for this project to be done. Groups are warned at the start that being simultaneously stretched across other projects in different teams with differing priorities and deadlines (dissertation, technology submission, field trip, crit, plus this project's demands) mirrors the nature of much contemporary professional practice. They are then left to find their own ways of making it work.

The teams research their subjects using whatever material, time and resources they can collectively bring to bear over a period of approximately 6-8 weeks. Whilst this, inevitably, means that there will always be some students who cannot attend some meetings, it quickly establishes the need for a record of discussions and decisions made and for other means of communication to be used as well. Their research has, in the past, led some groups to visit their practitioner's studios, meet clients and consultants and visit completed projects.

Assessment

In this project, two items of work are assessed:

the presentation of the team's findings and the single team report covering the same subject matter. Both presentation and report are in two parts. One half looks at the study project, the other looks at their own team's working methods and operation.

The presentations are assessed, like crits, on the day and in the heat of the moment. The reports are assessed in the cold light of the morning after. Teams are advised that they should allocate their presentation time appropriately between the study project and their own work. They are told that both subjects and the report and presentation are equally weighted. It is important that there is no suggestion to students that there are major and minor subjects. With student numbers between 80 and 120, we typically have up to 14 teams. Although the time for the presentations is limited, setting up beforehand and the question and answer session afterwards, mean the team presentations take up a substantial block of time. Usually this is a long afternoon, stretching into the evening if needed. Whilst the reports are tutor assessed, we have also experimented with peer assessment of the presentations, with a view to maintaining student involvement in the presentations throughout the long half day session.

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INTERDISCIPLINARY DESIGN FOR THE

The IDBE course is a post graduate course for those with a few years' experience of working in the real world. This is not the only model for cross disciplinary teaching, nor is it necessarily seen as the sole worthwhile approach, but it does respond to a need expressed by employers and students alike. It has the advantage of allowing industry's problems and opportunities to be discussed by students who have enriched their specialist theoretical knowledge with a knowledge of practice. The majority of students are drawn from the principal built environment disciplines: engineering (civil, structural, building services and transport), architecture, surveying (quantity surveying and building surveying) and construction, but it is also accepts small numbers of students from very different

backgrounds. Coming from professions with different aims and value systems, these students provide a valuable outsider viewpoint that provides a check to the sometimes cosy hermetic thinking of industry insiders.

The course is part-time, running parallel with its students' working life. It offers seven, week long, residential study sessions spread over two years. During most of these sessions a design exercise is set, with the students being formed, typically, into four person design groups. The intention is that each group contains a mix of disciplines reflecting a real world design team. The design tasks range in scale from the design of a facade system to the planning of a new settlement. The projects are intended to offer an opportunity for the students to experiment with

new areas of knowledge and, importantly, to reflect upon how they, as individuals, work in a team. It also creates an environment in which the assumptions, goals and methods of others can be interrogated, free from the risk of jeopardising working relationships on live projects and in which mistakes can be made without the threat of litigation.

Design projects are not marked. This surprises many and the course repeatedly has to defend its position. The defence has two parts: one is a matter of educational intent and the other pragmatic. We see the projects as an opportunity to play with new ideas and to reach out into unfamiliar territory in a supportive environment. Marking such work would inevitably introduce a competitive edge which

BUILT ENVIRONMENT (IDBE)

would both undermine the collaborative ethos and by valuing the end result, would encourage students to withdraw to the safe position of their discipline rather than explore the unknown. It could be argued therefore that the student's process should be assessed rather than the product but this is where we have the practical difficulty of assessing individual contributions in a group effort when much of the work may be done out of sight of the assessors. It is easy to form a casual view of the commitment and/or ability of individuals within a group but not a rigorous one on which the award of a degree might depend. We are frequently asked how we achieve the commitment of the students' un-assessed work. The only response that can be made is that this has never been a difficulty. We have found that

if we take care to develop design tasks that ask interesting questions then the students' natural desire to be inventive is sufficient to keep them engaged. Perhaps too, the time available - three or four days - is sufficiently short for the rush of interest that designers feel for a new project, to be naturally sustained.

The course has no ambition to create a body of generalists. It assumes that specialism is vital if the complexity of design is to be safely navigated. However, specialists who can neither appreciate the contribution of others nor can articulate their own needs, create a friction in the co-ordination of the thought and effort which disables both invention and production. Effective negotiation in design is not measured by the success of one party in defending, through

adversarial advocacy, the specialist's narrow definition of project goals. It is measured by its success in capturing criteria which transcend the ambitions of individual disciplines and represent the collective understanding of 'good design' that might be shared by designers, clients, users and, of course, wider society. Negotiation in design therefore needs negotiators who are equipped to imagine solutions that serve this common goal and obliges each specialist to search for solutions that implicitly address the legitimate aspirations of other disciplines. This interdisciplinary imagination can only be achieved by designers who are offered insights into what these aspirations may be.

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Since its inception, this project has been linked to an assessment method that asks students to assess the contributions made by their team colleagues to the team's performance whilst also allowing variations in team size. This means student teams cope with the late arrival or departure of students easily. We point out that teams of unequal size mirror a typical aspect of professional practice, where small and large practices compete like David and Goliath.

Support Requirements

Only very limited academic support has ever been offered. The emphasis has always been on staff supporting the team if needed and the team supporting individual students. Tutor support takes two forms:

- We do not give individual tutorials in this project. Individuals who contact the tutor are referred back to their team. If requested, we will offer team tutorials, but we insist at least 75% of the group turn up. If they do not, the team is inquorate and they go away. In practice, such tutorials are rarely requested and only in exceptional circumstances.
- The tutor will handle email queries, but again from the team rather than individuals. The team delegates a member to be the funnel for email queries to a tutor. Any team question or tutor answer that might be generally applicable is circulated to all teams. That delegate also has the job of passing on any housekeeping announcements or notices to the rest of his or her team.

With 100 students involved, this makes the work manageable for a single tutor but, more importantly, it demands the discussion of queries before the tutor is involved. This often has the effect of answering or resolving the question within the team without the tutor, promoting the idea of the 'wisdom of teams.' Technical support (with audio visual equipment, computer connections etc.) has been useful, particularly on presentation day when smooth changes between groups is essential. We

always leave it to teams to make their own arrangements for equipment and support, but as tutors we should note our grateful thanks to the support staff of both our institutions.

Enablers & Barriers

Certain developments have helped the teams function better. Possibly the most important ones have been the setting up of communications, the near universal availability of email, mobile phones and text messaging have meant that even distributed teams can perform well together.

To encourage interaction, teams are explicitly and forcefully reminded that until everyone in the team knows what everyone else knows, the team cannot start to function properly or creatively. There have, on occasions, been difficulties with students being absent for part of the project, for example due to field trips, illness or late arrival on the course. The general policy has been to leave it up to the student to explain his or her absence to the team and for the teams to respond as the team felt appropriate.

Over the last five years, the use of Powerpoint for presentations has become increasingly prevalent. It allows for the easy incorporation of internet material and the presentation itself can easily be inserted in the report. While these presentations (and the subsequent reports) have acquired a particular style and visual 'gloss', a more important drawback has sometimes been the creation of 'Techie' subgroups (designated 'the nerds').

Groups are now warned that any subdivision by skills should not be paralleled by a subdivision of knowledge. This can be probed in the Question & Answer session.

Evidence of Success

Students have supported the project enthusiastically for the past five years. They report that they have met and worked with peers they did not know before. Some have recognised that, while we often choose friends who are "like us", teams where members are different bring a range of points of view and so often produce surprising work that they could never have created individually. The vast majority of students

have considered any occasional discomfort or disagreements during the project a worthwhile price. Considering that there are no timetabled opportunities for team meetings or work it is a sign of their commitment and interest that the teams function at all. Student support has been more formally recorded by both feedback questionnaires and informal discussion.

A version of the project was recently run with a year that had a record of poor attendance and limited social cohesion. There, other benefits were noted:

- Significantly, attendance and engagement throughout the project was excellent with few exceptions.
- Students who previously had shown little commitment to their studies began to shine and to demonstrate their particular knowledge and skills.

The nature of the project and the presentation demands meant that students often employed media they had not used before while still producing a finished piece of work.

How this can be reproduced

Set a few, simple ground rules and stand back. Leave space for the team to sort matters out. The simplest and most fundamental change is the shift in focus and subject matter. That is easily introduced. As long as students know the presentation of their own experiences carries the same weight as the study of the project, they will devote equal effort to it. Basic information on teams and teamwork is useful, but any input on the rather unusual aspects of creative or design teams and the people involved will help students immensely. It obviously helps if the teams and the subject projects are multi-disciplinary, but we feel that it's equally important that the random mixing of students is transparent. Students shouldn't feel that their team or their subject has been 'genetically engineered'. When asked, all have said they preferred the luck of the draw.

The Questions and Answers after each presentation are valuable. Ideally, most questions (and all answers) should come from the students. The tutor's ideal role here is to keep quiet and watch the clock. If students seem

initially reserved about asking questions, allocate roles or rules such as "The team that's just finished presenting will lead the Q&A on the next presentation." It is important to foster a sense of achievement and celebration at the end of the project. Encourage applause at the end of each presentation. A short session at the end of the presentations is helpful to round things up. The tutor can ask for brief preliminary feedback and can also offer heartfelt thanks to all the groups for their efforts.

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INTER-DISCIPLINARY TEAMWORK: A SUSTAINABLE SOLUTION

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Teaching sustainable issues through the use of a group design project can not only help students to contextualise the knowledge and skill they require to produce a design solution, but it can also provide an excellent opportunity to develop inter-disciplinary teamworking skills. Designing a sustainable solution requires the application of a very wide range of environmental aspects. If these are to be accommodated within a single design

solution in the limited time period of a group project, this can generate too many issues for any one student to take on board at any one time.

A common solution to this problem often adopted by students is to divide up the different aspects of the work between them. However, they soon discover that the work is so inter-related that it is impossible for them to work in isolation. For example, a

student draughting plans and elevations has to work closely with the student investigating the daylighting performance of the building. This needs to be married with optimising the solar gain, which in turn must link with the heat loss of the building, also influenced by the ventilation strategy. The student considering the 'green' specification of materials and components will need to work with all these students to produce the overall agreed solution. A decision on one aspect will have a profound effect on many of the others. Thus, a sustainable design problem provides an excellent opportunity to develop inter-disciplinary teamworking skills. A solution cannot be reached without co-operation between the various players. Aspects of design, economics, building services, technology and construction management are all brought to bear in solving environmental problems.

The Group Project

This group project work approach is used at Anglia Polytechnic University (APU) to achieve the twin goals of developing an

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understanding of the impact of environmental issues on the architectural design process and the development of inter-disciplinary teamworking skills. Each student group of about 4 to 5 students is given a short design brief to design a building on a particular site which clearly shows its environmental pedigree. As well as asking the students to produce sketch proposals of their solutions, they are asked to complete a BREEAM (BRE's Environmental Assessment Method) of the design and evaluate their team performance. The project is designed to enable students to:

1. Use some of the design skills developed within the module to design an environmentally friendly building (the product).
2. Select and use appropriate design processes and design modelling tools for a variety of tasks.
3. Illustrate a number of design methods and strategies.
4. Complete a BREEAM assessment of a building design.
5. Use a pro-active approach to learning.
6. Develop inter-disciplinary teamworking skills.



7. Illustrate presentation skills.

Items 2 to 7 refer to the process. The list illustrates that the process is more important than the final product. That is, only the first outcome specifies the design of a product (the sustainable building), all the others relate to design and teamworking skills.

The project lasts for the 12 weeks of the module and students engage in activities that introduce a different environmental aspect of the design for the first six weeks. They consider aspects of the site and solar gain (unwanted and wanted), insulation and

heat loss, boiler selection, incidental gains, daylighting, ventilation, annual energy consumption and carbon dioxide emissions, selection of environmentally friendly materials, transport, pollution, water consumption, land use and ecology, and the general health and well being of building occupants. These are treated as primary generators for design ideas. During this time, students largely work on their own to develop the required knowledge and skill and to develop some of their design ideas.

By week seven, they come together in their group and start to produce a single design solution for their team. This approach ensures that all members of the team bring something to the first meeting and have some experience of the issues to be addressed. This first meeting of the team takes the form of a design crit in which each team member displays, presents and defends their early design ideas.

Group members evaluate these early design solutions and decide on the best design to take forward and develop. This can often produce a heated discussion before a hybrid solution is proposed, drawn from a number of good design ideas.

TABLE 1 - INTER-DISCIPLINARY TEAMWORK SKILLS

1.1	Contributing to group activity
1.2	Promoting good working relationships
1.3	Fulfilling responsibilities within a group
1.4	Fostering supportive peer relationships
1.5	Recognising group strengths & weaknesses
1.6	Criticising the work of others
1.7	Resolving disputes
1.8	Coaching and developing other team members
1.9	Providing team leadership and fellowship

Teamwork and Group Evaluation

A group strategy is devised and a plan of action is implemented to ensure that all members combine to produce a single solution by the agreed deadline. Students are thus engaged in a variety of teamwork skills. Some of these skills are listed in Table 1 bottom left.

As part of the coursework submission, the group is required to produce a reflective evaluation of how they have used the project to explore and develop these skills. They are also asked to evaluate each other's contribution to the overall success of the project by completing a peer group assessment, as illustrated in Table 2 on the right.

STUDENT NAME						TOTAL NET ADJUSTMENT
REASON FOR ADJUSTMENT						
ADJUSTMENT SCORE						TOTAL MUST BE ZERO

The whole student-centred nature of the project is focused on students grappling with problems and working together to produce solutions.

The tutor marks the final design as one submission. However, not all the members of the group will have necessarily made an equal contribution to the work. Students are asked to indicate an adjustment score for each team member, up to a maximum

of +/- 15 marks per student.

The total adjustment for the whole group must come to zero horizontally. That is, the students cannot all have +15 marks. Any additional marks must be balanced by an equal negative mark such that the total mark for the project remains the same. For example, three members of the group could have +10 marks with two members receiving -15 marks each. Each member

of the group is asked to sign a declaration to confirm their acceptance of the group decision. This is done before they know the group mark.

Care must be taken here to ensure that a student with a negative adjustment score does not regard this as a measure of their negative contribution to the work. It should be seen as a method of recognising the extra positive contribution of their colleagues.

Often when students are discussing this, they do find it difficult, but it can be a useful tool to resolve disputes. Many students prefer to record an even distribution of the marks, but just getting them to discuss the issues is a useful exercise.



CONCLUSION

The use of a group design project on environmental issues is an excellent way of providing an opportunity for students to develop inter-disciplinary skills. They can explore a range of inter-related aspects of environmental design at the same time as developing teamworking skills. The student-centred, problem-solving approach encourages active learning on important teamworking skills necessary for industry.

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