Teaching and Learning RESEARCH BRIEFING

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Learning and Teaching at University

The Influence of Subjects and Settings

The coming of mass higher education has brought larger classes, more diverse students and leaner unit costs, but keener interest in teaching quality and graduate attributes. This research surveyed what and how undergraduate students learned in this changed landscape. It investigated how the quality of learning and teaching was shaped by subject areas and course settings, and ways of using research evidence to enhance course effectiveness.

• Underlying what students learnt in specific course units was a developing grasp of how to think and go about the subject like an expert.	→ The concept of ways of thinking and practising in a subject offers a powerful means of planning and evaluating the fundamental goals of a degree.
• There was an inescapable subject dimension not only to what students learnt but also to how they were taught and assessed in undergraduate courses.	→ In efforts to review and enhance teaching and learning, more attention should be given to what is distinctive about a given subject area.
• Although most courses worked well as environments that supported learning, students were often dissatisfied with the guidance and feedback on course work.	→ Feedback needs to be faster and more helpful to students, particularly where they are inexperienced in undergraduate study and classes are large and diverse.
• Conceptually focused research evidence about students' experiences of their courses helped staff to fine-tune teaching and learning environments.	→ The quality of learning and teaching in undergraduate courses can be systematically enhanced through using richer sources of evidence to guide course development.

T·L·R·P TEACHING & LEARNING RESEARCH PROGRAMME

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

The research

We worked closely with teams responsible for course units or modules in the early and late stages of degree programmes, usually the first and final years, in four contrasting subject areas – biology, economics, electronic engineering and history – at a representative range of higher education institutions. Data were gathered from questionnaires, interviews and course documentation.

After a first round of data collection and analysis, we discussed our emerging findings with each course team and, where appropriate and feasible, helped them to devise ways of improving course effectiveness. The impact of these initiatives was then systematically monitored.

Key Concepts and Findings

- **learning and engagement**

We aimed to evaluate the quality of students' learning on a range of measures which looked at how they went about their studying as well as what they were gaining from their studies in each of the subject areas. One set of measures focuses on students' approaches to studying and differentiate between:

- Deep Approaches that aim at understanding, using evidence and relating ideas
- Surface Approaches, where the focus is on memorising rather than understanding or active engagement with the subject-matter
- Organised Effort, which taps into how students are organising their studying and whether they are using their time effectively

We found good indications of growth in the quality of student learning as students progressed through their undergraduate studies. Across the four subject areas, scores for deep approach and organised effort were somewhat higher for the later and final-year course units. More noticeably, the scores on surface approach were relatively lower in the later years. Students' ratings of teaching indicated that highly rated teaching was linked with higher levels of deep approach and lower scores on surface.

However, the learning processes involved in a deep approach differed markedly between subject areas, and increased in complexity over successive years of study. It therefore became more fruitful to focus on students' developing grasp of the distinctive ways of thinking and practising (WTPs) characteristic of each subject area. These became a prime focus of the project.

We found that although these ways of thinking and practising called for a firm foundation of subject knowledge, they were more widely based. They also encompassed subject-specific skills and know-how, a growing familiarity with conventions for communicating within the subject area, and a widening appreciation of how new knowledge within the field was generated.

In the final-year bioscience course units, WTPs evolved through direct engagement with experimental data and the research literature, and by mastering the conventions of oral and written scientific discourse. In economics, the emphasis was on describing and modelling economic systems and reasoning about them. In the history courses, where WTPs could blossom even in the first year, they took such guises as a movement away from narrative, an avoidance of 'presentism' (interpreting the past in terms of today's values), and an openness to alternative interpretations, recognising the contested nature of historical knowledge. Finally, the close focus on a specific topic within engineering – analogue electronics – drew attention to the importance of a deep approach to problem-solving in understanding the functions of circuits.

A further insight emerged from our work in economics: the notion of threshold concepts which lead to higher levels of understanding. Two examples of such concepts were 'opportunity cost' and 'elasticity', which staff believed would open up previously inaccessible ways of thinking about certain aspects of the subject — a transformed way of understanding without which the learner could not progress. However, such transformations were likely to prove troublesome for students, since they entailed leaving behind earlier, comfortable positions to explore new and disconcerting ones.

- **courses as teaching-learning environments**

A dauntingly wide array of factors can influence the quality of students' learning on any course. Our study focused on those factors which affect the 'inner' teaching-learning environment. These are likely to be direct rather than indirect influences on learning and they may be factors over which course teams have some scope for action. They include the design of the curriculum; what students bring to, and aim to take from, a course; teaching, learning support and assessment strategies; and how course units are organised and managed. We wanted to examine the congruence, or 'goodness-of-fit,' between these factors and high-quality learning processes and outcomes. In other words, how far did they facilitate rather than work against deep understanding and a developing grasp of WTPs in the subject?

We found considerable variety in how students were taught and supported and in how they were assessed. These variations were apparent not only between subjects but also across different course units in the same subject. But despite this diversity, teaching and support staff in the courses and institutions surveyed were generally perceived as enthusiastic, helpful and approachable. Face-to-face teaching-learning activities were sometimes complemented by web-based learning resources, and students could use email and the Internet. Most students thought that assessment methods were congruent with the pursuit of understanding. Many examples could be identified of thoughtful and imaginative teaching which students singled out for praise.

Higher student scores on deep approach and organised effort were generally associated with course environments seen by students as encouraging higher-quality learning, combining clear aims with coherent teaching approaches, and supporting students through set work and feedback. Staff enthusiasm, together with student supportiveness towards one another, were also contributory factors, albeit less strongly.

But as our interviews with students revealed, there were aspects of course environments that were less congruent with high-quality learning. With some exceptions (most notably in history and a bioscience course unit), there was pervasive dissatisfaction with the adequacy of guidance and feedback on set work. Various concerns were highlighted by the students: the timing and frequency of feedback, the consistency and helpfulness of comments, the provision of worked examples (in engineering), and the adequacy of guidance about assessment expectations and criteria.

There were also important differences in course environments between years. Final-year courses tended to have more varied approaches to teaching and assessment and greater student choice, smaller class sizes and better resources.

By contrast, first-year courses with high and diverse enrolments could face particular challenges. These included the risks of impersonality in large classes, inconsistencies between tutors where course teams were also large and diverse, and curricula that, while well-suited to the majority of students taking a unit, could disadvantage and demotivate others with different aspirations or depth of background knowledge in the subject.

- **evidence-based quality enhancement**

Despite tight timescales and many other competing pressures upon course teams, it proved possible within the research project to take forward a variety of course-based initiatives to enhance the quality of provision.

The emerging questionnaire and interview findings, alongside course teams' own observations and soundings of student opinion, were used to design strategies to improve the quality of the students' learning. They included initiatives to strengthen students' use of reasoning and problem-solving strategies, to ensure that students' breadth of knowledge was balanced with depth of understanding, and to communicate expectations better by boosting feedback on set work.

Not every initiative met with equal success, but where circumstances were favourable, the outcomes were encouraging. They showed the potential for robust, evidence-based approaches to quality enhancement that benefit from fresh conceptual insights and richer data about influences on students' learning.

- **the disciplinary dimension**

In each discipline we studied, staff tended to describe their intentions for teaching their course unit in terms of broad disciplinary goals, rather than through the narrower 'intended learning outcomes' for the unit formally documented in course handbooks and prospectuses. It was in their discussions of these broader subject goals that staff most frequently demonstrated their commitment to fostering WTPs in their students.

The subject areas proved to be distinctive not only in the ways of thinking and practising each called for, but also in the teaching, learning and assessment methods deployed within them. It was as if there was an inner logic which linked together the demands of each subject with how it was taught and assessed in supporting students' learning. We found correspondences between the specific WTPs of a subject and the elements of the teaching which students felt contributed most strongly to their learning. This suggested that the most successful approaches to teaching were those which addressed the disciplinary WTPs most directly.

Major implications

Here we focus particularly on the implications of our findings for sustaining and enhancing the quality of learning and teaching in contemporary higher education. These implications are not aimed solely at university teachers. They are also relevant to academic managers, to academic and educational developers, and to those with responsibilities for quality assurance and accountability for standards.

The development of WTP

Our findings on students' evolving grasp of ways of thinking and practising in a subject draw attention to what high-quality undergraduate learning entails. They suggest that students thrive on opportunities to engage actively with a subject in its various guises. This means that as well as assimilating subject knowledge, students need to master the skills, strategies and conventions that are inseparable from the practice of the subject at an advanced level. Current procedures for course design and review seem to concentrate attention on specific module outcomes rather than on these more fundamental goals. This can mean that students fail to make connections between topics and do not come to see the subject as an integrated whole.

Refocusing on the subject

Our findings also underscored the fundamental importance of the subject dimension to learning and teaching in higher education. As the preparation and development of UK university teachers becomes more formalised and better-established, it is vital that activities and resources which traverse subject boundaries be complemented by opportunities to consider discipline-specific purposes and requirements. Generic approaches are valuable, but need to be reinterpreted within each disciplinary setting.

Resourcing the first year

The ways in which course design and management influence learning are particularly apparent at first-year level. Here class sizes are at their largest, while variations are greatest in the knowledge and experience students bring to a course and their strength of commitment to the subject. Given these challenges, there would be good grounds for committing relatively greater resources per student than in later years, yet puzzlingly, the reverse is more usual. A reappraisal of where resources might best be concentrated seems to be called for.

Large-course management

Leading and managing courses with large and diverse student intakes and course teams calls for formidable expertise. Greater attention needs to be given to how large-course managers are supported and the demands of the role appropriately acknowledged.

Better feedback to students

Our findings on feedback to students showed cause for concern and highlighted great variability in adequacy of provision, within and beyond the first year. A way forward may be to spread the many instances of good current feedback practices more widely, across subject areas, course units and individual tutors.

Responsive course management

In the institutions we surveyed, there was a prevailing orthodoxy of quality assurance. It included a focus on end-of-module rather than formative course evaluations, short, standard questionnaires that could not address course-specific needs or relate responses to students' backgrounds and aspirations, and in some cases, long lead-times before course designs could be modified. These limitations made it difficult for course teams to identify and respond promptly to issues and concerns that arose.

Collaborative, evidence-based enhancement

In our research we drew on multiple methods and sources of data, used emerging findings to jointly plan and monitor course improvements, and harnessed the expertise of course teams, educational researchers and academic developers. Such a collaborative, evidence-based approach has potential for much wider use in enhancing teaching quality.

New analytical tools

And finally, the new concepts emerging from our research open up fresh vistas on learning and teaching in an age of mass higher education. We have shown how students' evolving grasp of ways of thinking and practising underpins their mastery of a subject, while threshold concepts can sometimes impede their progress. We have seen that high-quality learning is associated with course environments that are congruent on a range of dimensions. Our research offers lecturers, tutors, course teams and educational developers new analytical and evaluation tools. These can be powerful aids to planning, monitoring, reviewing and enhancing undergraduate courses.

Further information

The best source of information on the research is the project's website (www.tla.ed.ac.uk/etl). It contains a concise Digest and a fuller Overview Report on each of the four subject areas. There are also occasional and end-of-award reports and conference papers, as well as the project's interview schedules and *Learning and Studying* and *Experiences of Teaching and Learning* questionnaires.

Aspects of the project's work and findings are also discussed in the following:

Anderson, C. & Day, K. (2005) Purposive environments: engaging students in the values and practices of history. *Higher Education* 49, 319-343

Anderson, C. & Hounsell, D. (2007). Knowledge practices: "doing the subject" in undergraduate courses. *The Curriculum Journal* 18.4, pp. 463-478.

Entwistle, N., McCune, V. & Hounsell, J. (2003) Investigating ways of enhancing university teaching-learning environments: measuring students' approaches to studying and perceptions of teaching. In: E. De Corte, et al., eds. *Unravelling Basic Components and Dimensions of Powerful Learning Environments*. Oxford: Elsevier.

Entwistle, N., Nisbet, J. and Bromage, A. (2005). Teaching-learning environments and student learning in electronic engineering. In L. Verschaffel, E. et al., eds. *Powerful Environments for Promoting Deep Conceptual and Strategic Learning*. Leuven: Leuven UP, 175-198.

Hounsell, D. and Hounsell, J. (2007). Teaching-learning environments in contemporary mass higher education. In: Entwistle, N.J., et al., eds. *Student Learning and University Teaching*. (British Journal of Educational Psychology Monographs, Series II). Leicester: British Psychological Society, 91-111.

McCune, V. and Hounsell, D. (2005) The development of students' ways of thinking and practising in three final-year biology courses. *Higher Education* 49, 255-289

Meyer, J.H.F. and Land, R. (eds.) (2007) *Overcoming Barriers to Student Understanding: Threshold Concepts and Troublesome Knowledge*. Oxford: Routledge.

Reimann, N. (2004) First year teaching-learning environments in economics. *International Review of Economics Education* 3.1, 9-38.

The warrant

The conceptual framework underpinning the work of the project derived from the extensive previous research into student learning which has become a feature of many professional development programmes for university teachers.

In the course of the research, data was collected on 26 undergraduate course units in the four subject areas in eleven universities and one further education college. The students completed two questionnaires, the design of which drew partly on well-established student learning questionnaires and partly on a review of teaching quality reports and pilot interviews with highly rated departments. Items from the questionnaires have since been adapted for use in the National Student Survey.

In each course setting there were also semi-structured group interviews with samples of students, individual interviews with key course team staff, and analysis of course documentation. Over the two rounds of data-gathering, 6488 questionnaires were collected and interviews were conducted with 668 students and 90 staff.

Written reports on each course unit surveyed were fed back to and discussed with the course teams concerned, prior to identification where appropriate of possible initiatives to improve course effectiveness. Three research team members in each subject area cross-checked analyses, and emerging findings were discussed in meetings of the full research team and its two eminent international advisers, Professor David Perkins (Harvard University) and Professor Emeritus John Biggs (University of Hong Kong). The project's findings were also reviewed in forums to which representatives of course teams and wider subject centres and organisations were also invited.

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Project website:

www.tla.ed.ac.uk/etl

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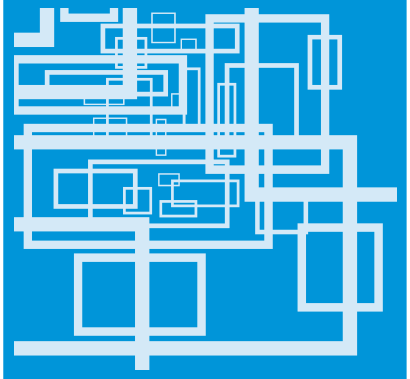
Teaching and Learning Research Programme



TLRP involves over 60 research teams with contributions from England, Northern Ireland, Scotland and Wales. Work began in 2000 and will continue to 2011.

Learning: TLRP's overarching aim is to improve outcomes for learners of all ages in teaching and learning contexts across the UK.

Outcomes: TLRP studies a broad range of learning outcomes, including the acquisition of skill, understanding, knowledge and qualifications and the development of attitudes, values and identities relevant to a learning society.

Lifecourse: TLRP supports projects and related activities at many ages and stages in education, training and lifelong learning.

Enrichment: TLRP commits to user engagement at all stages of research. It promotes research across disciplines, methodologies and sectors, and supports national and international co-operation.

Expertise: TLRP works to enhance capacity for all forms of research on teaching and learning, and for research informed policy and practice.

Improvement: TLRP develops the knowledge base on teaching and learning and policy and practice in the UK.

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