

Project Events

The project is organising two series of seminars which will take place in Cambridge during late 2006 and early 2007.

Threshold Concepts in the Disciplines

These seminars will explore teacher and student perspectives on teaching and learning threshold concepts across a range of subject areas and identify areas of commonality and difference in how threshold concepts are represented and addressed in teaching and learning.

Interdisciplinary Perspectives on Threshold Concepts

A parallel series of three one-day seminars will bring together representatives of different disciplines with the intention of exploring conceptual models, ontologies and methodologies related to threshold concepts, and of developing interdisciplinary approaches to further research.

Seminar 1: Interdisciplinary Perspectives of Threshold Concepts

Seminar 2: Threshold Concepts in the Disciplines: A Review

Seminar 3: Enhancing Teaching and Learning of Threshold Concepts with Technology

Project Team



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Transforming Perspectives

Technology to Support Teaching and Learning of Threshold Concepts

A Technology-Enhanced Learning Project within the Teaching and Learning Research Programme

Centre for Applied Research into Educational Technologies
and
Department of Plant Sciences
and
The Computer Laboratory
at the
University of Cambridge



What are Threshold Concepts?

Threshold concepts have been defined by Meyer and Land (2006) as being:

- **transformative**: occasioning a 'significant shift in the perception of a subject'
- probably **irreversible**: 'the change in perspective occasioned by acquisition of a threshold concept is unlikely to be forgotten'
- **integrative**: exposing the 'previously hidden interrelatedness of something'
- often **bounded**: 'any conceptual space will have terminal frontiers, bordering with thresholds into new conceptual areas'
- potentially **troublesome**: they may appear 'counter-intuitive, alien [...] or incoherent'

Threshold concepts have been associated with problem-based learning and their transformative aspect, which demands that learners rework their prior knowledge, locates them within models of teaching and learning as **conceptual change**. They are also potentially important in social 'situated' models, which see learning as participation in discipline-specific discourse and activity.

Meyer, E. and Land, R. (2006) 'Threshold Concepts and Troublesome Knowledge: An Introduction' in Meyer, E. and Land, R. (eds.) *Overcoming Barriers to Student Understanding: Threshold Concepts and Troublesome Knowledge* (Routledge, London)

Threshold Concepts & Technology

Threshold Concepts, with their demand for conceptual change and revisiting of prior learning represent a challenge for developers of learning technologies. Any environment capable of supporting teaching and learning of these concepts must be flexible and adaptive, and allow collaboration between teachers and learners and amongst groups of learners.

Opportunities for the development of such environments may emerge from research into 'semantic web' technologies and adaptive hypermedia, which would make possible the representation of, and interaction with, 'webs' of concepts.

Examples include:

- the Intelligent Verilog Compiler, which uses an ontology-based architecture to provide diagnostic assessment and feedback to guide students in their programming exercises, and is used in part of the Computer Science course at the University of Cambridge;
- 'Intelligent Books', which are structured so that teachers and learners can add, reuse and restructure content and examples, and which allow alternative explanations in response to learner needs and preferences.

Project Aims and Objectives

The first main aim of the project is the establishment of an interdisciplinary network (including representatives from education, computer science, psychology and a range of subject domains) to explore perspectives on the teaching and learning of threshold concepts across a number of disciplines.

A second aim is the exploration of opportunities offered by a range of technologies (including, but not limited to, the adaptive intelligent tutoring systems being researched and developed at the University of Cambridge Computer Laboratory) to support the teaching and learning of threshold concepts across a range of disciplines.

Selected project outcomes include:

- a review of literatures related to threshold concepts across disciplines;
- development of a series of case studies of teaching and learning threshold concepts in the disciplines;
- establishment of an online environment to support work in both seminar series and to allow links to be established across seminar series, as well as to provide a location for interdisciplinary activities between seminars.