



Plant Sciences Pedagogy Project



Teaching for Learning NETWORK

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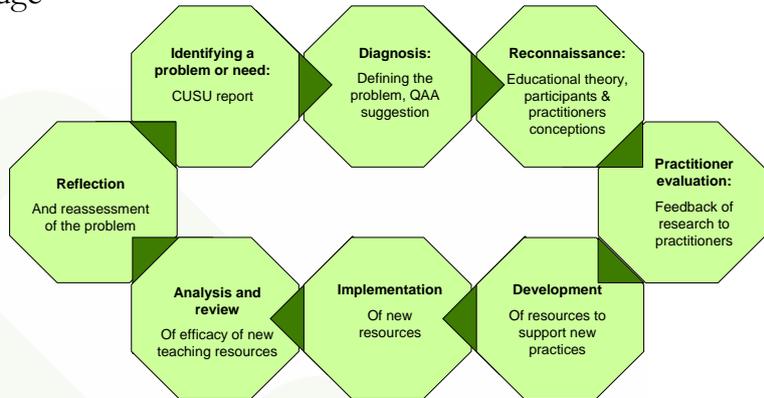
About the Project

The Plant Sciences Pedagogy Project began in the autumn of 2005, based at the Department of Plant Sciences, University of Cambridge and funded by the Cambridge-MIT Institute (CMI). The project has involved collaborative educational research between staff and students at the Department and members of the Centre for Applied Research in Educational Technologies (CARET) in Cambridge. Its aims were:

- to use educational research methods to **develop staff teaching practices**
- **improve student learning and engagement** with the subject
- to enhance **recruitment and retention of students** within the discipline

The research and development strategy comprised an action cycle (see diagram to the right), which began with processes of conceptualisation, data gathering and co-interpretation of research findings which were followed by implementation of new teaching support and learning materials and a final evaluation of their effects.

During the first year of the project (2005/06), the focus was on the diagnosis and reconnaissance phases, which were characterised by focus groups with students, semi-structured interviews with teaching staff, video analysis of small group teaching within the Department, and the administration of self-efficacy and practice-value gap questionnaires to students. These initial research findings informed the development of resources to support new practices, including a wide range of novel online learning tools for students within a new virtual learning environment



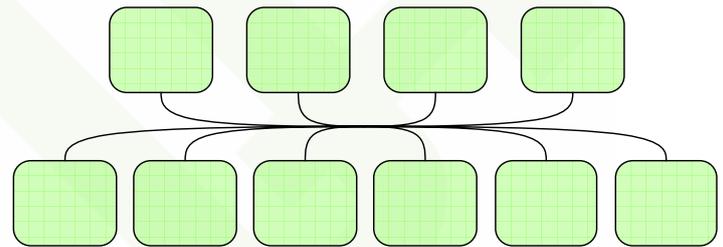
(VLE; the system used within Cambridge is known as CamTools), an online collaboration environment for tutors and a series of workshops for both staff and student audiences. The new resources were then implemented during the course of the 2006/07 academic year, and since then the project has focussed upon evaluating their effects, with the intention of feeding back findings into future development. Evaluation of the effectiveness of our research and action indicates that our intervention has positively influenced several aspects of teaching and learning.

Main findings

Initial research focused on forming a solid evidence base; a combination of focus groups, dual-scale questionnaires and semi-structured interviews were carried out within the Department with students and staff, and coupled with the initial literature review. Several key themes emerged, which included:

- **Making learning explicit** What is required to succeed on the course
- **Contingent teaching** (after Wood, 1997) Scaffolding of individual learning
- **Authentic learning** (after Roth, 1999) Relating concepts to 'real-world' examples
- **Student self-regulation & independent learning** Overcoming passivity
- **Constructive alignment, synthesis and throughlines** Visualizing the 'bigger picture' of the course, and links between different topics
- **Transparency & accountability** Regarding the course examinations and assessment systems

The themes were applied to the design of new resources for both students and staff. For students, these included a new online VLE (see figure below) populated with novel learning resources, and workshops; staff were given a virtual collaboration environment (VCE) for sharing ideas and resources for tutorials, and were also offered workshops.



Conclusions and future developments

The project has had a demonstrable positive impact upon teaching and learning within the Department. The successful interventions seen in the past academic year are currently being expanded upon, with results being fed back to shape the creation of further e-learning resources and workshop activities. The methodological tools and frameworks developed during the project will also continue to be exported into novel 'sister projects' in other academic departments participating in the Teaching for Learning Network.

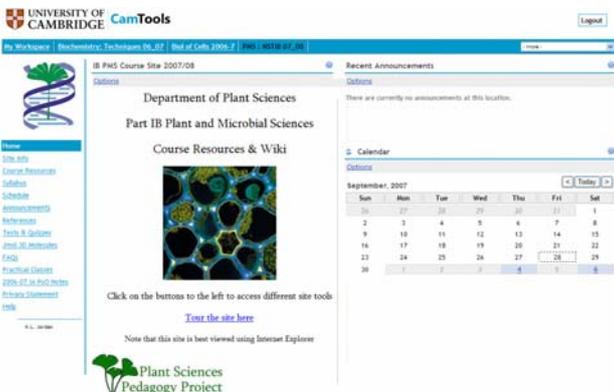
Recent publications

- Carmichael, P., Jordan, K., Johnstone, K., Tracy, F. and Truscott, H. (2006) 'Enhancing Small Group Teaching in Plant Sciences: A Research and Development Project in Higher Education' Paper presented at BERA Conference, September 2006, Warwick.
- Tracy, F., Jordan, K., Johnstone, K. (2007) 'Using the wiki the wrong way: a case study in Plant Sciences' Paper presented at the SOLSTICE Conference 2007, Edge Hill University.
- Tracy, F., Jordan, K., Johnstone, K., Carmichael, P. (2007) 'Using evidence informed approval to create online learning resources' Paper presented at the BLU Conference 2007, 14th June, University of Hertfordshire.
- Johnstone, K., Carmichael, P., Tracy, F., Jordan, K. and Truscott, H. (2007) 'Developing Evidence-Informed Practice in Undergraduate Teaching and Learning at the University of Cambridge', and:
- Carmichael, P., Burchmore, H., Tracy, F., and Johnstone, K. (2007) 'Threshold Concepts: An Emerging Interdisciplinary Research Agenda in Higher Education', both in: D. Good, S. Greenwald, R. Cox and Goldman, M. (eds.) University Collaboration for Innovation: Lessons from the Cambridge-MIT Institute (Rotterdam: Sense P Publishers).

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The efficacy of these interventions has been assessed via questionnaires to students and staff as well as analysis of VLE and VCE usage data. The student self-efficacy survey showed significant improvements in confidence about three specific plant science topics; interestingly, these particular topics had been provided with additional resources within the student VLE. VLE usage data showed students had engaged with the site and made use of its learning resources. Variability in the characteristics of student use highlights the benefit of designing a flexible VLE, providing resources in different formats to suit different learning styles. Usage data and responses to a questionnaire show that the teaching staff VCE has been used extensively for reference. The teaching workshops increased awareness of teaching and had a positive effect upon teaching practices.