

## Further information

A full report of this project will be submitted as a doctoral dissertation at the University of Cambridge during 2007, and prior to that, draft copies of the text are available on request from the author.

Preliminary papers, also available from the project researcher and detailing the findings of the first phase of the research, were presented at the BERA annual conferences in 2004 and 2005.

Correspondence is invited on any theme in this briefing.

The title comes from Maddison, A. (1982) *Microcomputers in the Classroom*. London: Hodder and Stoughton. He distinguishes between software which gives no indication to the user of the processes being examined, so-called 'black boxes', and those which are relatively transparent, which he calls 'glass boxes' (pp. 66-7).

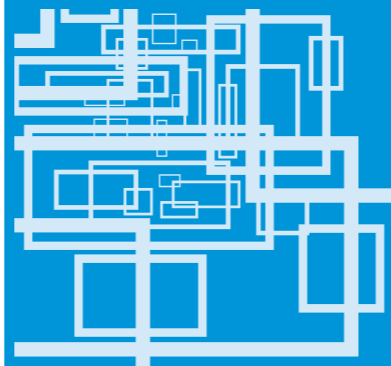
## The warrant

The findings presented in this briefing are based on field studies undertaken during the period 2003 to 2006. Across two different schools, and four repetitions and refinements of the experimental design, a total of more than 200 students participated in the research. The students were all in Years 9 or 10, in urban and suburban settings. The groups were of mixed ethnic composition, and comprised students in the upper quartile of the ability range. The topic question for the concept maps varied between the four studies, but all were drawn from the humanities curriculum. In each repeat of the experiment, the student groups were constructed to be directly comparable.

Comparisons between the groups were determined using population estimates of the effect sizes, and care was taken to ensure that confidence intervals were declared for these statistics. The student motivation data was obtained using a questionnaire survey, previously deployed in a similar international study, and the findings reported in this briefing are significant at the 5 per cent level. Selected students were also interviewed for the study, and extracts of their contributions appear in the study.

Although this project has covered new ground, in blending work on ICT, concept-mapping, collaboration and scoring, the findings are in broad agreement with the associated literature on collaborative learning and on the impact of assessment on motivation.

## Teaching and Learning Research Programme



TLRP involves over 30 research teams with contributions from England, Northern Ireland, Scotland and Wales. Work began in 2000 and will continue to 2008/9.

**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 life-long 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.

### TLRP Directors' Team

Professor Andrew Pollard | London  
Professor Mary James | London  
Professor Stephen Baron | Strathclyde  
Professor Alan Brown | Warwick  
Professor Miriam David | London  
e-team@groups.tlrp.org

### TLRP Programme Office

Sarah Douglas | sarah.douglas@ioe.ac.uk  
James O'Toole | j.o'toole@ioe.ac.uk  
tlrp@ioe.ac.uk

### TLRP

Institute of Education  
University of London  
20 Bedford Way  
London WC1H 0AL  
UK

Tel +44 (0)20 7911 5577



# Teaching and Learning RESEARCH BRIEFING

January 2007

Number 21

## From black boxes to glass boxes On-screen learning in schools with concept maps

Developing effective approaches to new technology in classrooms has been a constant challenge over the last decade. This project chose to examine the use of on-screen concept maps. Previous studies have demonstrated that computerised concept mapping can be effective. This briefing reports on how the effectiveness of this on-screen activity depends significantly on the strategy adopted by the teacher. This study also investigated the effect of incorporating an automated scoring process into the mapping activity, with surprising results.

- Students who used the on-screen concept-mapping tool alone and with no collaboration with other students achieved no significant sustained learning gain. → Despite the promise associated with using new technologies in the classroom, an unmediated switch to on-screen learning is unlikely to lead to improvements in learning.
- When the class collaborated in developing their concept maps, students demonstrated sustained and improved learning in a subsequent essay task. → The adoption of new classroom strategies as new software is introduced can be more significant than the impact of the software itself. Teachers looking for routes to improved learning with on-screen activities need to explore the powerful potential of peer collaboration.
- Providing automated scoring for the concept maps demotivated the weakest students and did not lead to any additional learning gains. → Automated approaches to assessment and instant scoring, often seen as a desirable goal, can exacerbate the limited motivation of lower-attainers.

**Project website:**  
[www.tlrp.org/proj/rtfbevan.html](http://www.tlrp.org/proj/rtfbevan.html)

**Project team:**  
Robin Bevan (TLRP Research Training Fellow) under supervision from Dr David Pedder, University of Cambridge Faculty of Education; Professor Mary James, Institute of Education London; Dr Patrick Carmichael, Centre for Applied Research in Educational Technologies, Cambridge

**Project contact:**  
Robin Bevan,  
King Edward VI Grammar School, Broomfield Road, Chelmsford, Essex CM1 3SX  
RBevan@kegs.org.uk  
+44 (0)1245 353510



January 2007

