

# ***Exploring teacher mediation of subject learning with ICT: A multimedia approach***

## **T-MEDIA Project Final Report to ESRC: Executive Summary**

Sara Hennessy & Rosemary Deaney

September 2007

The 'T-MEDIA' project used digital video to analyse and document how teachers exploit the use of digital technology resources to support learning in secondary-school subject lessons. The focus was on projection technology – data projectors and interactive whiteboards (IWBs). IWB systems are becoming a popular and integral feature of many classrooms. They comprise a computer linked to a projector and a large touch-sensitive board displaying the projected image (allowing direct input via finger or stylus). There has been substantial government investment recently in these powerful new technologies in primary and secondary schools in the UK. However, their rapid penetration has not been based on evidence about efficacy. This work addressed the need to investigate the evolving pedagogy underlying classroom use. It thus moved beyond the more conventional summative evaluation of the 'impact' of educational technology towards a focus on understanding *how and why* successful approaches work, and exploring how other resources and activities are complementary.

The research took a collaborative approach to the systematic analysis of video recordings of classroom activity in a small number of cases. Our goals were to assist teachers in making explicit the pedagogical rationale underlying their practice, and uniquely, to engage them in collaborative theory building about strategic technology use. The purpose was to understand, question, describe and disseminate classroom practice – with researchers and teachers acting as “co-enquirers”.

Four teachers of English, mathematics, science and history and their (low to middle attaining) students aged 12-15 took part in the research. The teachers were all experienced, reflective practitioners who used technology in their everyday practice. The specific practices included: 'active learning' about the photosynthesis process in science; constructing collective interpretations of GCSE 'anti-social' poetry in English; use of multiple technological resources in history to support analysis of evidence concerning the 'golden age of Elizabeth I'; using graphing software to teach the concepts of intercept and gradient in linear functions. The mathematics teacher used a data projector, laptops and tablet PC while the other three had IWBs.

Teachers were observed and videoed over six lessons each and interviewed four times. Student perspectives were also sought through focus group interviews by inducted peers. Copies of student work and lesson materials were collected, screen displays were captured, and teachers kept unstructured diaries. Each teacher and a subject colleague then collaborated with the two researchers in critical scrutiny and discussion of lesson videos and other data. This involved an intensive process of independent review of 'critical episodes' and four recorded joint meetings. Academic subject specialists also offered independent commentary on the videos.

A sociocultural framework provided the initial theoretical language, central constructs and lens through which to begin our joint analysis. These ideas were subsequently recontextualised within various practical settings involving use of projection technology as we engaged in dialogue centred around explaining the data. Our various interpretations were made visible, contrasted and debated, systematically tested, iteratively refined and extended. The process integrated the scholarly knowledge of university researchers and academic subject specialists with teachers' perspectives on how technology supports learning, and the professional 'craft knowledge' underlying their everyday practice. Each participant thus played a distinctive and mutually respected role in this

process of joint reflection on specific classroom experiences, and their representation and understanding in new ways.

Hence what we call “*intermediate theory*” – bridging between teachers’ perspectives on supporting learning in specific settings and key sociocultural constructs – was co-constructed by the teachers and university researchers. It is embodied within detailed narrative accounts of the themes emerging in each case and from an analysis across the four cases. These empirically grounded accounts are framed in a common accessible language. They illustrate a wide range of pedagogic strategies that teachers employ to exploit projection technology, including: *fostering active (cognitive / physical) participation* during interactive whole class teaching; *supporting public sharing and co-construction of conceptual knowledge and interpretations*, e.g. through *collective annotation on the board, modelling thinking / writing processes, scaffolding and personalising using projected images; flexibly adapting support and modes of technology use to diverse learning needs, goals and settings; ‘reigniting’ prior learning by revisiting products of class activity* including annotated slides; *priming for ICT use*, and *intertwining of ICT and other resources*.

The findings were ultimately exploited through collaborative development of five interactive CD-ROMs characterising the key strategies emerging in each case and across subjects. The discs present an overview of each lesson sequence; technology features used; information about participants and methodology; downloadable lesson resources; the emerging themes and narrative accounts, hyperlinked to related video clips and analytic commentary, in turn linked with professional development activities. These comprise issues and questions for reflection and discussion by individuals or groups of teacher colleagues. Consideration of alternative strategies and application to other classroom contexts is also encouraged.

This set of multimedia resources does not purport to offer models of “best practice” for replication, but rather a stimulus for debate. It ambitiously addresses a mixed audience of practitioners, teacher educators and researchers, offering the intermediate theory and video exemplars as a framework for guiding reflective thinking about how the technologies potentially – and do – support effective pedagogy, their perceived ‘added value’, where they are under-exploited, and when other approaches may be more fruitful. The discs were professionally produced and are being widely disseminated (at cost price) via conferences, subject associations, Becta, initial teacher education institutions and various practitioner and academic networks. Two resources are already hosted online (on the National Centre for Excellence in the Teaching of Mathematics portal). The unique format and content of the resources has provoked an enthusiastic reception so far, particularly from teacher educators who greatly welcome professional development materials to support practitioners in making effective use of the interactive projection technologies now adorning their classrooms.

In sum this research makes three kinds of contribution to the field – methodological and theoretical (development of the collaborative intermediate theory building process and resulting accounts of pedagogical approaches), and practical (multimedia tools for professional development), all construing teaching as a reflective practice.