Bridging between Research and Practice

Supporting Professional Development through Collaborative Studies of Classroom Teaching with Technology

Sara Hennessy
University of Cambridge, UK

This book presents a fresh approach to bridging the perceived gap between academic and classroom cultures. It describes a unique form of research partnership whereby Cambridge University academics and school teachers together grappled with and reformulated theory – through in-depth case studies analysing practice using interactive whiteboards in five subject areas. The inquiry exploited the collaborators’ complementary professional knowledge bases. Teachers’ voices are particularly audible in co-authored case study chapters. Outcomes included deeper insights into concepts of sociocultural learning theory and classroom dialogue, more analytical mindsets, sustained new practices and ways of working collegially.

The book reflects upon the power of lesson video review and details how the co-inquirers negotiated “intermediate theory” – bridging educational theory and specific settings – framed in mutually accessible language and embodied in interactive multimedia resources for teacher development. These include video clips, analytic commentary from multiple perspectives, lesson materials, plus optional prompts for reflection and critique – not models of “best practice”. The resources make pedagogy explicit and vividly illustrate the book’s ideas, offering theory-informed yet practical tools designed with and for practitioners. Hennessy and colleagues have tested a model of ongoing, teacher-led development and innovation, professional dialogue and classroom trialing stimulated by discussing selected multimedia resources.

The book will interest academic and teacher researchers, initial teacher educators, professional development leaders, mentors, plus practitioners interested in using interactive whiteboards and dialogic teaching. It explores widening approaches to collegial development to reach educators working in other contexts (with and without technology). This could involve intermediate theory building or shortcutting by sharing and adapting the outcomes – springboarding teachers’ further critique and professional learning.

“I cannot recommend this book too highly … it weaves a complex developmental story with a range of facets. It emphasises clearly the rigour of the research that was conducted, while demonstrating the complexity of the inter-relationships, practices and issues for both teachers and researchers in developing practical and theoretical knowledge. Its graphic insights through text and associated media provide exemplars for teachers and those who work with teachers as a rich resource. It shows us all what can be achieved and the means of achieving it.”

Prof. Barbara Jaworski, University of Loughborough

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Rationale:
This series purposely sets out to illustrate a range of approaches to Professional Learning and to highlight the importance of teachers and teacher educators taking the lead in reframing and responding to their practice, not just to illuminate the field but to foster genuine educational change.

Audience:
The series will be of interest to teachers, teacher educators and others in fields of professional practice as the context and practice of the pedagogue is the prime focus of such work. Professional Learning is closely aligned to much of the ideas associated with reflective practice, action research, practitioner inquiry and teacher as researcher.
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To the inspirational and reflective teacher colleagues who participated in the research with such energy, professionalism and unfailing enthusiasm. It was an immense privilege to work closely together and I learned so much from you.
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This book *Bridging between research and practice: supporting professional development through collaborative studies of classroom teaching with technology* presents a rich developmental research study in the UK into teaching and teaching development crossing four subject areas: history, science, English and mathematics. Teaching and learning take place in real classrooms in real schools in which there is no attempt to hide the many aspects of school and classroom practice with which a teacher has to contend in offering students the best possible learning experiences in a subject. Classrooms are well equipped with digital technologies and it is taken for granted that the design of teaching will include use of technology (principally the interactive whiteboard, IWB) as a normal aspect of teaching-learning practice. Researchers from the university and teachers from project schools work collegially, recognising that both teachers and researchers bring important knowledge and experience to the teaching-research interface; both are ‘co-learners’ or ‘co-inquirers’.

Central to all consideration and discussion in the book is the notion of theory. Theory underpins the design of the projects and activity in schools and informs project findings. Within a sociocultural frame, teaching is seen to mediate learning, a dialogic approach to teaching and learning is taken as the norm and constructs such as scaffolding and funnelling become recognised or instantiated in practice. Teachers and researchers, reflecting on experienced and observed classroom practice, issues in teaching, and students’ learning, relate their insights to theoretical perspectives in order to synthesise from experience.

Associated with the book are two internet sites hosting professional development resources¹, one of which includes digital presentation of all aspects and stages of the T-MEDIA project and a set of video clips for each classroom studied. If we see the book as providing orthogonal axes on teaching development and research inquiry, the digital resource provides a third axis, orthogonal to the first two, enriching the ideas and issues through the digital medium. Thus, as the reader meets ideas and issues through the pages of the book, she can for example, move to a video clip from the classroom, or hear the teacher reflecting on what was learned in the lesson. This dynamic facility parallels fluidity in the classroom between the various media of teaching and learning.

The book reports on two forms of collaboration between the research team and selected teachers. In the first (known as the T-MEDIA project), a major focus is the partnership between researchers and teachers in studying and analysing classroom practice (the teaching and learning) from the design phase through analysis of
classroom activity to a theoretical synthesis of the teaching-learning process. The second form of collaboration focuses on teachers’ development of classroom practices with the support of their research colleagues. The first leads naturally to the second: the collaborative study of teaching and learning led to new forms of awareness for teachers (as well as the researchers) and suggested new modes for CPD (continuous professional development) for teachers.

In Part 1 of the book, from case studies of classroom teaching and learning, we gain insight into the ‘co-construction’ of the learning process by teachers and students. This is paralleled by a co-construction of ‘intermediate theory’ by teachers and researchers through collaborative thematic analysis of digital video recordings and other data. For example, in the study of science teaching (Chapter 3) the teacher Chris conceptualises what he calls a *learning journey* as “a scaffolded pathway towards achievement of new learning” (p. 95). This leads to a discussion with researchers about the zone of proximal development (ZPD) and ways in which the activity of the classroom can be construed in relation to the ZPD. Within a broad sociocultural framework, Chris’s *learning journey*, *scaffolding* and *use of ZPD* constitute an area of *intermediate theory* and illustrate the teachers’ “analytic mindset” (p. 203). Each case draws out important themes and associated intermediate theory which are compared and contrasted in a cross-case analysis (Chapter 5). All teachers use a dialogic approach in the classroom, using technology to support innovative ways of stimulating students’ engagement in the subject material and discussion of ideas and issues. The dialogic approach extends further to the use of video recordings of classrooms, not only as a tool for analysis, but to stimulate discussion of learning and teaching between researchers and teachers. As the literature suggests (e.g. Coles, 2012; Jaworski, 1994; Sherin, 2007), the result of such stimulated discussion is a deep learning experience for all participants, and is theory-related. The authors reflect on this methodology and extend the associated theory building in two chapters (Chapters 6 and 7).

As a mathematics educator myself, I was fascinated to read the cases in the other subject areas – religion in Tudor times (history), photosynthesis (science) and anti-social poetry (English). It was a joy to see how these teachers created scenarios for their students in which subject-specific knowledge could be communicated, with the use of technology allowing students to explore ideas, discuss issues and engage in depth with subject concepts. The cases offer clear images of how teachers thought about and designed their teaching as well as the ways in which they interacted with their students and encouraged learning. For example, teacher Jackie selected poems and used the IWB to encourage students to take on the persona of the writer of the poem, feel the emotions, discuss alternative points of view and draw on visual images to support analyses of human behaviour. More than this, however, we see how dialogue with the researchers, stimulated by the video material, led to teachers formulating their craft knowledge in more theoretical terms – contributing to generation of codes in the analytical process and developing towards greater knowledge in teaching. Such dialogue clearly played a formative role for both teachers and researchers: for teachers, stimulating professional development opportunities and, for researchers, enabling
higher level theoretical syntheses. Throughout description and analysis we find technology (especially the IWB) permeating activity in the classroom. Technology afforded dynamic visual presentation, provisionality and technical interactivity (as in the use of multiple resources, textual and graphical annotation – often by hand – and the drag and drop facility). Readers can link to the online T-MEDIA facility to expand the book’s text and access new examples and visual insights.

The second part of the book, *Designing a framework for teachers’ professional learning*, includes the impact of the T-MEDIA study, one year later, on teachers who had participated and their colleagues. The researchers were interested to find out whether new thinking and practices had been sustained and/or taken up by other colleagues. Three aspects stand out as having impact:

– The development of intermediate theory and the concepts to which it related (scaffolding and funnelling were mentioned particularly): teachers felt that the emergence of a terminology helped them to gain deeper insight into the concepts in practice.
– The dialogic approach with use of technology: central to all classrooms, this was highly valued and sustained by the participating teachers who inspired colleagues to try it for themselves
– The importance of video recordings and their use in collaborative analysis of events leading to deeper insights into issues in practice: for example, teachers reported having developed a more critical approach to observation of their own and colleagues’ lessons and those of trainee teachers.

It seems clear from what is reported, and especially from the quotations from teachers, that developmental processes from the T-MEDIA project were sustained by the participating teachers and that certain of their colleagues were inspired to take up ideas and practices. Moreover the project was hugely formative for the participating teachers, not only in opening up new visions of practice, but also, through the methodology of dialogic analysis of video recordings linked to theory, in allowing teachers to articulate their knowledge-in-practice in new ways. The book is successful in allowing the teachers’ voice to reveal the developmental process and its outcomes for the teachers. Although the original T-MEDIA project had been designed to study and characterise teaching-learning practice using technology, not to develop teaching, it was clear that important development had taken place.

As Hennessy points out, there is a great deal of wisdom to suggest that CPD consisting of a top-down approach to showing teachers what they should be doing in their classrooms is doomed to failure. The unwitting developmental approach discussed here accords with much that I have experienced in my own professional career. When teachers are inspired to inquire into their own practice, to question what they are doing and why they are doing it and to start to develop ‘intermediate theory’, then they start to change their practice (Jaworski, 1994, 1998, 2008). Moreover they are excited by the levels of engagement that this generates and become ambassadors for change (not least in the three respects listed above).
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For the project leaders, such recognition of development in practice led to their conceptualisation of a developmental methodology (for professional learning) related to the methodology of the original project. From the original project, the T-MEDIA and other related resources were now in the public domain. Thus the follow-up projects were designed explicitly to use these resources with new teachers to develop dialogic teaching-learning with technology, and discussion stimulated by use of classroom video recordings. The book reports on one case of this use with mathematics teachers (Chapter 9) conducted by experienced teachers. Three cases in other subjects employed a range of resources alongside the T-MEDIA video examples, during the Dialogue and IWBs project (Chapters 6, 10). Outcomes of both projects suggest that explicit use of these methodologies leads to successful professional development for the teachers concerned, taking place in their own schools. Success is judged through teachers’ motivation, engagement and inquiry into new ways of approaching teaching and learning.

Although much of the book focuses on the learning of the teachers, it is clear that the researchers recognise their own deep learning through their engagement with the teachers. Co-learning, through analysis of video records, generated insights which drew on theory, which theory was unable to predict, but which deepened their awareness of theory in relation to practice. For the researchers, this was new knowledge-in-practice. Just as the teachers developed their thinking and practice through co-learning with researchers, so too the researchers developed their practice as leaders of professional development activities for teachers. Their co-learning was deeply intertwined with the methodology of practice and provides a powerful illustration of the learning outcomes this methodology can generate.

I cannot recommend this book too highly. In its necessarily linear presentation of the projects through the chapters of a book, it weaves a complex developmental story with a range of facets. It emphasises clearly the rigour of the research that was conducted, while demonstrating the complexity of the inter-relationships, practices and issues for both teachers and researchers in developing practical and theoretical knowledge. Its graphic insights through text and associated media provide exemplars for teachers and those who work with teachers as a rich resource. It shows us all what can be achieved and the means of achieving it.

There is always a ‘but’! Although researchers and teachers worked in real schools with real students and had to contend with all the issues of practice in the sociocultural settings in which the research took place, there is nevertheless a sense of privilege and cocoon. Teachers are able and committed, as are the researchers. There is a wealth of knowledge and resource. How can the approaches developed here meet the needs of educational practice more widely? Hennessy recognises that development at scale is a “thorny” issue (p. 281). She points to the multiple sets of materials that have evolved from the project, drawing on the researchers’ deeply experienced insights. Not least, we see the T-MEDIA resource incorporating video material to provide ideas and examples of practice, and as a basis for recognition and critical discussion of teaching-learning issues. However, no materials, however
good, can by themselves generate the developments in practice that we see portrayed in these pages. It is in the use of such materials that developmental power is invested. As we read this book and ponder on the messages it brings, we have to consider what is needed to promote effective use on a large scale. While individuals can learn for their own immediate practice, it requires the wider stakeholders of the educational enterprise, including government, to address development at scale. Given a will to do this, what we see here provides important starting points.

NOTE

1 http://t-media.educ.cam.ac.uk; http://dialogueiwb.educ.cam.ac.uk/.

REFERENCES


INTRODUCTION

There is a misconception… that educational theories are established facts or undisputable truths that have direct applicability to the classroom….and can be "plugged" into actual situations and yield direct results….like one applies a proven remedy to a disease. (Gordon, 2007b, p.xi)

There is a long-recognised chasm perceived between two educational cultures. On the one hand there is academic research and the educational theories that it generates; on the other there is everyday classroom practice, the problems arising and pedagogical strategies. Biesta (2007) traces the questioning of a relationship between educational research and practice back to the 18th century. Today the cultures of academia and schooling have different concerns, vocabularies, reward systems and resource levels for research, as well as different views of “knowledge” (de Vries & Pieters, 2007). Various attempts to bridge the chasm and – importantly – to analyse and understand exactly how research-based knowledge and practitioner knowledge differ and complement each other (McIntyre, 2005) have produced valuable insights. The primacy of research-based knowledge has been challenged (e.g. Nuthall, 2004), and a more sophisticated understanding of the possibilities for its relevance and use has emerged.

Research is often construed as producing “technical” or “instrumental” knowledge that points the way to a particular educational outcome: “what works” or the “evidence-based practice” beloved of policymakers in particular. Practitioners may be viewed as autonomous users of fundamental knowledge produced by basic research, or research is the provider of fundamental knowledge for the development of technologies or design knowledge (“engineering model”; these alternatives and others are outlined by Staub, 2004). Underlying these views is an assumption that teaching has a direct, measurable effect on learning. Yet they ignore the need for learners to interpret and make sense of what they are taught, and the factors mediating that process. Prominent factors include the specific characteristics of the particular setting and the various participants in the educational interaction (pupils, teacher, head teacher, parents etc.). The common perception of the technical role of research is questioned by Biesta (2007) who considers that research can inform and improve practice through providing different interpretations and understandings of educational practice (including theories), and that premise underlies this book too. Biesta argues that this often overlooked cultural role is equally – perhaps even more – practical in that it radically shapes the way that we see practice and opportunities for action.

In fact there are multiple gaps perceived between research and practice and hence different aims and strategies for bridging them (Bauer & Fischer, 2007; Biesta, 2007; Gordon & O’Brien, 2007). A review of the different solution models and a survey of
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different stakeholders’ perspectives of these by Broekkamp and van Hout-Wolters (2007) suggest that the models are ideally complementary rather than conflicting. Many analyses have been simplistically monocausal or exaggerated and few offer ready-for-use solutions (ibid.). Nevertheless there is a dawning realisation that bridging is not a simplistic, one-way transmission of knowledge from producers to consumers or a straightforward ‘translation’ into classroom practice of either research-derived theory or recipes for action. Moreover, it is not the traditional form of ‘transfer’, which is largely discredited in the literature on pupil learning and vocational learning (Hager & Hodkinson, 2009) across contexts and which seems equally unhelpful in this context of teacher learning. It is nevertheless recognised that a simple demonstration and briefing from a colleague is insufficient, and “the originator needs to engage in joint planning and as a critical friend or coach”; teachers then need to find ways of fine-tuning the new practice to the needs of their classes (Fielding, 2005). However barriers acknowledged include problems being ill-structured, goals being shifting, ill-defined or competing, and information being incomplete, ambiguous, or changing (ibid.). A key factor is that teaching is full of unanticipated, diverse and unique situations that require professional judgment (K. Smith, 2007) and ongoing change, and this may obstruct generalisability of research outcomes that are too tightly framed. It also precludes the production or mechanical application of a silver-bullet solution to a practical problem. As Gardner (2011, p. 544) expressed it,

Research … may prove too subtle and complex to be assimilated with effect. The problem may stem from communication or … engagement with our audiences but more likely it is the sheer complexity of educational contexts that constrain impact. Ultimately, our research may be transformational but as a rule it simply does not have immediacy or clarity of impact that in other fields a new drug or technological innovation might have.

Consequently it is difficult for policymakers to distil the clear messages they seek and other, competing political imperatives on policy making occlude the messages from empirical inquiry. Alton-Lee (2011, p. 325) optimistically highlights the potential contribution of the growing availability of trustworthy, “best evidence” syntheses (e.g. from the EPPI-Centre) in guiding educational policy and practice about the conditions for professional development that have transformational impact at system level…when bodies of evidence are acted on. Gardner concludes, however, that educational research cannot be represented or distilled into simple one-line actions and that it may take many years for its insights to filter through to policy or practice. Likewise, while there may indeed be “nothing so practical as a good theory” (Lewin, 1951, p. 169), an educational theory must be “applied in more nuanced and contextual ways, taking into account the social–historical context in which it was created as well as the various particulars of each classroom situation” (Gordon, 2007b, p.xii). There are multiple ways of applying theory to practice in different disciplines.

It is now acknowledged that practitioners have a wealth of untapped and undervalued expertise at their fingertips that can provide many insights for university
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researchers (and for their teacher peers). They can be co-creators of knowledge, given the right opportunities (de Vries & Pieters, 2007). There has been an increasing emphasis on research partnership and collaboration between groups of university researchers and school-based practitioners. There has also been a shift away from an emphasis on critique of existing practice (including comparison with the merits of proposed research-based changes), and towards a critique of proposed changes from the perspective of existing practice and of the local context (McIntyre, 2005). Finally, teachers have rarely contributed to formulating research questions and conducting studies, yet in recent years, increasing numbers have become engaged in school-based action research. A relatively recent approach aiming to develop theory as well as new forms of practice is the ‘design experiment’ (Design-Based Research Collective, 2003). Researchers collaborate closely with practitioners, and they are jointly accountable for the interventions and experiments carried out through repeated cycles of designing, implementation, and analyses. Detailed local knowledge from the field of practice is drawn upon.

Despite these welcome developments, conventional academic research is still perceived by many teachers as too idealistic, general, partial, time-limited, resource-intensive, closeted in scholarly journals, abstract, jargonistic, inaccessible, self-interested and irrelevant to their personal concerns, professional experiences and the complex practical realities of classroom life (Gordon & O’Brien, 2007; D. H. Hargreaves, 1996; Hiebert, Gallimore, & Stigler, 2002; Nuthall, 2004). In one Dutch survey, practitioners, policymakers, academic researchers and teacher educators alike considered that research is inconclusive, theoretical, insufficiently contextualised, fragmented and of low status (Broekkamp & van Hout-Wolters, 2007). Moreover, most practitioners lack an informative, durable professional knowledge base and rarely search spontaneously for research-based knowledge. At best research reports are seen primarily as a source of useful ideas about things they might perhaps try when circumstances permit.

There is an acceptance that teachers are most strongly influenced by evidence drawn from the specific contexts with which they are familiar, case studies of ‘good practice’ produced by other teachers and the often tacit knowledge derived from substantial professional experience, with systematic research only an occasional and rather haphazard factor (James, Pollard, Rees, & Taylor, 2005, p. 112).

In the UK, even in Teaching Schools whose formal role in research and development is clearly stated in National College for School Leadership policy and for whom a national research and development network has been set up, there is little evidence of using existing research and some involvement in research is not acknowledged as such. Sebba, Kent and Tregenza (2012) reported on joint practice development projects in five Teaching School alliances (chosen for their strong track record on sharing practice with other schools, practitioner research and inquiry and collaborative innovation in teaching practice) that aimed to develop effective approaches to cross-
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school ‘joint practice development’ (Fielding, 2005) and ‘knowledge transfer’. The report observed that “current systems for teachers to access research are limited and those in the joint practice development projects were more likely to get their research information if at all, from Twitter or blogs which are rarely quality assured. (p.1-2).” The report detected very little awareness or use of the National College network and on-line community. It found that schools have relatively few ideas on how to progress ongoing engagement in action research, so that support and better infrastructures for spreading the findings to other colleagues are needed. Sebba et al. concluded that a common perception of research seems to be of teachers pursuing Masters degrees, not using research findings to inform their everyday work. They also suggested that an emphasis by senior leaders in schools on very short-term outcomes, fuelled by having to bid (inefficiently) for each small source of funding, may mitigate against the effective use of research. This undermined an expected strategic approach in planning for at least 1-2 years.

Some argue that practitioners may desist from actively using scholarly research findings because they lack the skills, mechanisms and support to do so (Broekkamp & van Hout-Wolters, 2007). Research is a potential source of indirect influence via professional development programmes, textbooks and policies, but potential mediators (teacher educators, publishers, policymakers, professional development organisations) are often ineffective in “implementing” its insights (ibid.). Lewis, Perry, & Murata (2006, p. 8) point out that too often, spread of a “proven” innovation is regarded as a separate research phase and a mere technical chore, despite the overwhelming evidence of the difficulty of the dissemination phase and its intimate relationship to the initial characteristics of the innovation as an externally designed entity (Burkhardt & Schoenfeld, 2003). In summary, it should be incumbent on researchers to move beyond the premature stopping point, causal inferences about effectiveness under controlled circumstances at initial sites. They should justify their choice of research methods based on the endpoint— “legs” or instructional improvement at sites of spread and whether it is likely to promote or to undermine effective local adaptation and grassroots spread of innovation (Lewis, et al., 2006, p. 8).

In sum, the tensions persist and the divide remains, perhaps as wide as ever – despite teachers of course being those who could most benefit from educational research.

THE APPROACH AND AUDIENCE OF THIS BOOK

This book presents a fresh approach to the problem. I describe and critique a unique form of research partnership in which university researchers and in-service school teachers were – and are – building and refining theory through collaboratively analysing and critically reflecting on classroom practice. The research itself happens to focus on the use of interactive whiteboards to support teaching and learning in a variety of subject areas. The overarching aim of the research programme, however,
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is to use classroom research observations and collaborative analysis to bridge the gap between theory and practice. It is asserted that the barriers between them start to be broken down when new understandings of practice that are mutually useful to practitioners and academics begin to arise. This could be said to be a form of professional learning for both partners.

The work contributes a more detailed description of the specific ways that theory was brought to bear and renegotiated than is typically observed in accounts of university–schools partnerships in inquiry, even where the focus is on aligning theory with practice (as Seidl [2008] points out in her review of one such account by Marek & Laubach, 2007). The work additionally offers a general approach to school-based professional development aimed at developing pedagogy – and some specific materials to draw on in the domains of subject teaching and learning supported by ICT (information and communications technology), and classroom dialogue. This is important at a time when responsibility for teacher education and development is being increasingly devolved to schools.

This book seeks to consolidate and disseminate this work, stimulating further thinking about the issues arising. Readers are invited to interact with and critique these ideas. I hope that the discussion will be of particular interest to:

- educational researchers and teacher educators – particularly those involved in research partnerships/mentoring and continuing professional development;
- teacher-researchers (including those undertaking higher education-accredited projects), participants in and coordinators of school-based research and professional development, and teacher mentors;
- practitioners at any level interested in making effective use of whole-class digital technologies, especially interactive whiteboards, and/or in developing a dialogic teaching approach.

THE RESEARCH PROGRAMME AND OUTCOMES

The research programme was conducted by the author in collaboration with a number of colleagues at the University of Cambridge. It developed a distinctive line of empirical co-inquiry, which may be characterised as collaborative, systematic investigation aimed at augmenting knowledge; this involved both academic researchers and classroom teachers reflecting on and constructing shared interpretations of classroom practice. The practice we chose to focus on was the critical role of the teacher in purposefully exploiting an exciting new technology—the interactive whiteboard (IWB) – to support subject learning. The IWB is a relatively recent cultural tool that is typically used for whole-class teaching and at the time of writing it is found in 85% of UK classrooms (Futuresource Consulting, 2013). Its use is increasing exponentially in a number of other countries too, notably Denmark, Netherlands, Australia, USA, Canada, Spain and Mexico, with use in both Europe and East Asia projected to surge in the next couple of years. An astounding 1 in 8
classrooms (34 million teaching spaces) across the world already have an IWB and by 2015, 1 in 5 will have one (ibid.).

We conducted and analysed classroom observations of teachers exploiting IWBs to support teaching and learning in a variety of subject areas. Seven in-depth case studies of six teachers involving observation of 33 lessons were carried out in primary, middle and (mainly) secondary schools in the East Anglia region of the UK from 2005–2010. Our shared interpretations of the IWB-supported practice drew on teachers’ extensive professional knowledge, on their perspectives on how technology supports learning in specific, authentic everyday contexts, and on key constructs emerging in the scholarly literature. Both the methodology of collaboration and the substantive topic area of the case studies are considered widely applicable across settings and school subject areas, largely by virtue of their lack of prescription.

The account in this book focuses largely on the ‘T-MEDIA’ research project (“Teacher Mediation of Subject Learning with ICT: A Multimedia Approach”), carried out with Rosemary Deaney and centred on case studies of collaborative work with three experienced, reflective practitioners in secondary English, science and history and a further study of mathematics teaching. It describes and illustrates how multiple perspectives and interpretations were made visible, debated, tested and iteratively refined. A rigorous process of reviewing digital lesson videos, and of identifying critical episodes and the underlying rationale proved a powerful catalyst for introspection and reflection.

The process of collaborative thematic data analysis culminated in a collective narrative account that encapsulated both teachers’ and researchers’ voices. This is framed in a common accessible language and grounded in classroom practice. It was embodied in a series of five professionally produced, interactive multimedia resources. These characterised the key themes and strategies emerging in each case, along with illustrative video sequences and linked professional development activities. Our materials are unconventional in their portrayal of authentic, everyday (rather than supposedly “best”) practice, inclusion of pertinent analytic commentary on every episode and built-in points for reflection and discussion.

The impact upon the participating teachers’ thinking and subsequent practice of participation in the theory-building process, and sharing of their learning with other colleagues, are the subject of one follow-up study reported (Chapter 8). Another follow-up study focused on using the multimedia resource produced in one subject (mathematics) as a stimulus for reflection within a teacher-led process of collaborative professional development with groups of colleagues in other schools. It again charted changes in thinking and practice (Chapter 9).

A later project, ‘Dialogue and IWBs,’ is also used to illustrate how some aspects of the work were developed further. The issues surrounding research partnership were investigated through case studies of using interactive whiteboards to support classroom dialogue (Chapter 6). This choice of topic has an important bearing on the research into co-inquiry. Dialogic teaching is an evolving pedagogical approach in which teachers and learners are actively commenting and building on each other’s
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The role of video throughout the research programme is powerful and multifaceted, and its value is reflected upon in the book. Lesson video was used in three key ways: first, in extractive mode (Haw & Hadfield, 2011) to support our classroom observations and capture detailed representations of the classroom interactions; second, in reflective mode (ibid.), using playback during the analysis process to prompt discussion, reflection and interpretation from multiple perspectives. University researchers and academic subject specialists, teachers who featured in the episodes, and teachers who did not (both subject colleagues and teachers from other schools and disciplines) each viewed the footage with a different professional lens. Third, jointly selected critical episodes were professionally edited and produced as illustrative clips aimed at our target audiences. They were used in a communicative mode through embedding them in professional learning resources and presentations emerging from both projects.

BUILDING ‘INTERMEDIATE THEORY’

The starting point of our co-inquiries was making explicit both scholarly and practitioner knowledge in order that both could be reassessed, exploited and integrated – potentially offering both parties a fruitful line of inquiry. This idea is expressed in the key concept of intermediate theory: theory that bridges educational theory and a specific setting – specifying the conditions in which theory applies (see Section 1, Introduction for elaboration). In the case of the T-MEDIA project, a diverse range of relevant ideas from sociocultural theory was appropriated, integrated, recontextualised and adapted to mesh with teachers’ own perspectives. In the subsequent Dialogue and IWBs project we explored, reformulated and extended definitions of dialogue through co-inquiry with practitioners who had an established dialogic pedagogy. The three participating teachers were offered indirect experience of each other’s very different classroom settings as they worked together, and the process culminated in democratically negotiated, enriched understandings of dialogue and dialogic pedagogy, framed in easily accessible language that consciously adapted them for wider use.

The process of integrating our perspectives with insights derived from joint critique of the literature and insights emerging from the data was a reflexive one.
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\nin both research projects – and was itself dialogic. In line with a dialogic approach, emerging conditions for success include the essential theorising element (difficult for hard-pressed teachers to engage with under normal circumstances) and a supportive climate of mutual respect for the different but complementary kinds of expertise that university researchers and practitioner participants bring to the collaborative partnership. These include the critical stance and theoretical perspectives of academic discourse, and teachers’ craft knowledge about pedagogical practices, learners and specific classroom contexts (Putnam & Borko, 2000). The account characterises the dynamics – especially facilitation, conduct and outcomes – of this process of reflective dialogue, an element largely missing in the body of literature on professional learning (Nehring, Laboy, & Catarius, 2010). It offers concrete examples via transcribed excerpts of our workshop dialogue with groups of seasoned professionals (the literature focuses on the learning of novices).

A key outcome of the research programme is a proposed flexible framework for equitable research partnership between academics and practitioners that interrogates theory but is ultimately aimed at improving practice – through reflective dialogue. It presents a new opportunity to build a strong professional knowledge base that spans the teaching and research professions, informing both about how we might support effective teaching and learning in our schools.

USING THIS BOOK

Aims and Outline
The substantive findings of the various projects outlined above are used to illustrate the process of sustained collaboration between university researchers, the teachers and their departmental colleagues, with additional input from academic subject specialists. So while use of the technology provided the context for our research collaboration and is alluded to throughout as such, it is the process of collaborative theory building that is the primary focus of this book; the unique methodology developed and refined through this work is offered as its most significant contribution. In principle the theory-building process could equally have taken place in a non-technology context, with teachers of other subjects, and so on; thus it has wider implications. Likewise, the research studies were carried out in the UK but the implications are not specific to that national context.

A secondary purpose of the book is to present, through the case studies, the emerging strategies for mediating classroom use of IWBs – which may be of particular interest to audiences of practitioners and teacher educators. The strategies are not prescriptive but offer alternative approaches and perspectives to consider; these in turn constitute potential stimuli for change. Additional illustrations of the strategies appear in a series of publications,5 in a set of multimedia resources developed during T-MEDIA, and in an additional professional development resource that illustrates how the IWB can support classroom dialogue. Note that free access to the four subject-specific T-MEDIA multimedia resources, and the “across-subjects” resource, hyperlinked to
Different audiences may well find certain chapters more interesting than others and the book is designed for dipping into. Section One outlines how academic researchers worked together with teachers in using theory to understand practice and in refining theory. It begins with an introduction to the theoretical underpinning, including the concept of intermediate theory. The rest of the section describes the processes of classroom observation and subsequent collaborative analysis, and the themes emerging. Chapter 1 sets out the evolution of a methodology for developing intermediate theory. This is followed by three case studies (a chapter for each of history, English and science teaching) that illustrate the process in practice and the teaching strategies emerging. These chapters (2–4) were written in conjunction with participating teachers, and they include rich detail and verbatim accounts. Chapter 5 summarises the pedagogical themes emerging across subject areas. Chapter 6 illustrates how the methodological approach to theory building was developed further in three additional case studies of interactive whiteboard use (developing dialogic classroom interaction in English, history and personal, social, health and citizenship education). Chapter 7 synthesises across all of the preceding six chapters. It theorises about bridging between research and practice through reflecting on the methodological approach to theory building via collaborative review of lesson videos. Preconditions, critical features, and scalable benefits of our evolving approach are identified.

Section Two is shorter and examines the relationship of the process with participating teachers’ professional development and subsequent practice. Here the notion of the research partnership between classroom and university educators is extended by exploring how outcomes may be used to support other teachers’ professional learning. Chapter 8 reports a follow-up study on the impact of involvement in the three T-MEDIA case studies described earlier and Chapter 9 describes a subsequent trial of the emerging approach to school-based professional development with secondary mathematics teachers. Chapter 10 reports on the outcomes of the Dialogue and IWBs project for participants, their schools and for teachers elsewhere through published professional development resources. These chapters report some sustained tangible impacts of engagement with theory, reflection and trialling new approaches and tools on the professional thinking and practice of participating teachers and evidence of their spread and independent adaptation by colleagues in participating schools.

The book concludes in Chapter 11 with some suggestions arising in the light of this and related work: How we might formulate new forms of in-service professional...
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development that are concerned with purposefully supporting teachers in developing pedagogical insights. Thus, Section One Introduction plus Chapters 1, 7 and 11 chart the developing approach itself, with other chapters interspersed to provide the evidence base and illustrate how it was developed and applied in practice.

A Theory-Informed, Teacher-Led Approach to Professional Learning

Our approach firmly distances itself from traditional one-off, top-down interventions aimed at fidelity to – or improvement in – a particular aspect of practice or policy. In the case of technology use, these typically seek to ‘train’ teachers by developing a discrete set of skills – without follow-up opportunities or continued support (e.g. J. G. Wells, 2007) – often paying little attention to pedagogical aims. Such approaches are frequently unsuccessful in terms of provoking durable change (B. Davis et al., 2009). Even longer courses or workshops where teachers successfully develop awareness and confidence in alternative conceptualisations of teaching can lead to little actual change in practice without ongoing support, because turning new knowledge and ideas into practice is highly challenging (Goldstein, Mnisi, & Rodwell, 1999).

By contrast, our research partnership model is founded on developing new understandings of the principles underlying an innovative approach and thereby constructing new possibilities for teaching. This means recognising challenges, dilemmas and situational constraints, and suggesting practical strategies for addressing those (Marx, Blumenfeld, Krajcik, & Soloway, 1998). It involves supporting teacher communities in pacing and monitoring their own progress. These goals are achieved through a process of sustained, situated, teacher-led development based on: using, discussing and refining intermediate theory already developed (or where time and inclination permit, engaging with scholarly theory afresh), joint reflection and critique of others’ and one’s own practices, and classroom trialling of new ideas, as a springboard for professional learning. The issues around participation of teachers in such a process of professional development are explored in Section Two.

Glossary

Terms in bold font (upon first usage) throughout the book are defined in the glossary at the back.

FOUNDATIONS OF THE WORK

Note that Chapters 1 and 7 draw on papers by Hennessy and Deaney (2009b) and Hennessy, Warwick and Mercer (2011); Chapter 2 is based on a paper by Deaney, Chapman and Hennessy (2009), Chapter 4 on Hennessy, Deaney and Tooley (2010), Chapters 6 and 10 on the aforementioned paper by Hennessy, Warwick and Mercer (2011) and on Warwick, Hennessy and Mercer (2011). Chapter 8 is based on xxx
Hennessy and Deaney (2009a). Chapter 9 develops the unpublished work of a project carried out by Hennessy, Deaney, Dawes and Bowker. Introduction chapter and section introductions along with Chapters 3, 5, 9 and 11 largely contain previously unpublished material.

AUTHORS

Three chapters (2, 9, 10) list contributing colleagues as co-authors. Case study chapters (2–4) are authored “with” contributions from each teacher. The remaining seven chapters (Introduction, 1, 5–8, 11) and two section introductions list no authors as they were written by Hennessy.

NOTES

1 http://eppi.ioe.ac.uk/.
2 The 30-month project was funded by the UK Economic and Social Research Council (ESRC) during 2005–2007: ref. RES000230825. Reports and publications are available at http://www.educ.cam.ac.uk/research/projects/istl/.
3 Although there were originally four subject case studies in the T-MEDIA project, presenting three in detail was considered quite sufficient. Since there was no IWB available in the mathematics classroom (only a data projector), setting that study apart from the others to some extent, it is not included in its own right here, although it is referred to where this is particularly informative, and a follow-up to the mathematics case study is presented in Chapter 9.
4 The “IWBs and Dialogic Teaching” project was undertaken in collaboration with Neil Mercer and Paul Warwick as part of a personal ESRC-funded Research Fellowship programme of work carried out in 2007–2010 by the author (ref. RES063270081). Reports and publications are available at http://dialogueiwb.educ.cam.ac.uk/.
SECTION ONE

DEVELOPING A FRAMEWORK FOR RESEARCHER–PRACTITIONER PARTNERSHIP: USING THEORY TO UNDERSTAND CLASSROOM PRACTICE

The theoretical framework provides the language, the constructs, the models and criteria through which educational contexts can be examined in a rigorous and systematic manner (Venville, 2006, p. 822).

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This section contains seven chapters describing how academic researchers worked together with classroom teachers in using theory to understand practice, and in refining theory. This section introduction examines previous approaches to research partnership as a form of continuing professional development and highlights those that focus on peer learning and reflective practice. It introduces the notion of intermediate theory and our approach to developing it through collaborative review of lesson videos. The rest of the section describes the processes of classroom observation and subsequent collaborative analysis, and the themes emerging.

BACKGROUND

What do we already know about effecting change in classroom practice? It has been shown that:

• imposed change has little chance of success (Cordingley, 2004);
• likewise, teachers do not tend automatically to alter their practice in light of research findings encountered (Cordingley, 2004);
• change is gradual and extends only as far as participants feel comfortable: “Change is usually not a radical and revolutionary process, but a (slow) historical evolution of the possibility spaces experienced by practitioners” (Roth & Tobin, 2004, p. 174);
• change is sometimes impeded by day-to-day functioning, which needs to be paramount.
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In a more positive vein, we know that the most promising approaches to professional development:

• are collaborative, drawing on teachers’ local networks and encouraging peer learning through dialogue, especially in face-to-face settings (OECD, 2009; Wishart & Eagle, 2011);
• are sustained and intensive, supporting teachers’ ongoing reflection and rethinking of their own classroom practice (J. G. Wells, 2007; Zwart, Wubbels, Bergen, & Bolhuis, 2007);
• consider teaching as inquiry (Alton-Lee, 2011) and engage teachers in concrete, experiential tasks that are rooted in ongoing inquiry (Marek & Laubach, 2007; OECD, 1998, 2009; J. G. Wells, 2007);
• attend to the social context of the school and the messy, practical realities of classroom life;
• build on teachers’ knowledge bases; critique new proposals from the perspective of existing practice (McIntyre, 2005);
• allow teachers to identify their own starting points and choose their own aspects of practice to research, improve or adapt (Lampert & Loewenberg Ball, 1998; William, 2009);
• involve regular meetings of a “teacher learning community” focused on a shared goal (as with the popular “Assessment for Learning” approach) - where teachers jointly plan teaching improvements and report on progress to colleagues (William, 2009);
• include voluntary lesson observation by pairs or triads of teachers or by pupils, and giving structured, constructive feedback; observation can offer new strategies, challenge set routines, and suggest new ways to analyse and evaluate student learning (Sebba, et al., 2012).

A one-size-fits-all approach has never proved successful in education. James and McCormick (2009) found that much of the roll out of the immensely popular Assessment for Learning approach in England has focused on giving teachers procedures to try out in the classroom without considering what they already believe about learning in the first place. Evidence from their data suggests that teachers who feel more committed and able to promote learner autonomy (20% of the sample) are more likely to realise it in their classrooms than others. They also have a greater sense of their own agency, and they test and develop innovative ideas in their own classrooms in creative ways.

A few years ago, a national in-service initiative to train all school teachers in England to use new technologies in their teaching came to be widely regarded as a failure, albeit with some pockets of success. An evaluation of the initiative (N. Davis, Preston, & Sahin, 2009) yielded some important messages: whereas centralised skills-focused approaches in this area were found to be inadequate, the most successful model proved to be an “organic” approach designed to support
evolution of each teacher’s classroom, school and region. Face-to-face training, workbooks and group assignments were supported by case studies of good practice. Successful characteristics of this approach included:

• school-based training using the school’s own ICT equipment and resources;
• a direct relationship with each teacher’s beliefs, subject discipline and pedagogy;
• embedded tasks that made specific links to participants’ professional practice;
• personal objective setting and a collective needs analysis for each group;
• active learning opportunities by teachers developing their own professionalism over an extended period of time with teachers in the same community of practice.

These indicators for successful professional development and, in particular, the time required for reflection, sharing and debating with colleagues, collectively offer the basis of a framework for professional learning in which the focus is on reflexively and collaboratively developing new insights into pedagogy. These kinds of sustained collaboration over time are clearly a far cry from the isolated, short-term professional development events that teachers are expected to attend; without ongoing support, feedback or sharing of experiences, systemic change is unlikely and teachers naturally revert to prior practices that have become automatic (William, 2009, p. 22). In this book, the term “continuing professional development” or CPD is used only to refer to opportunities for teacher learning that are genuinely continuing over time rather than one-off.

The focus in these contemporary approaches is conspicuously on “peer learning” and “reflective practice”. Peers can play a critical role. Glazer and Hannafin (2006) describe reciprocal interactions between teachers sharing and evaluating teaching strategies and ideas they develop together in the pursuit of shared curricular and pedagogical goals. These terms represent laudable practice with potential power. But they require scrutiny, since both can mean many different things, and the quality of change is subject to the motivations of those involved.

Manouchehri (2001) points out the need to distinguish between affective engagement and cognitive involvement. Observing two teachers who were engaged in what is often called “peer coaching”, and who held that teaching was largely a matter for individual teachers to define, she noted that their peer observations were unfocused and comments to each other were limited to briefly noting differences in practices. The other’s pedagogy was not challenged or even discussed (despite recognition of critical weaknesses), although it was a stimulus for private reflection upon their own practice. This contrasted with another pair who were keen to debate, to learn and to improve practice. However, one of the team members proactively created a productive professional discourse structure for interactions with her peer, who initially held similar beliefs about individual responsibility to the first pair and merely acted as listener. She questioned her colleague in depth and made connections to theories about why events in both his class and her own had occurred or what other outcomes could have been expected, thus drawing him into engagement with
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explanatory theories. The author concluded that collegiality per se – albeit linked with emotional support and sharing of daily experiences – may not provoke change in practices, since a critical stance also appears to be needed. To initiate and sustain a culture of peer support for improving practice, roles and responsibilities of colleagues may need to be redefined: “Teachers need first to believe that they have the right, and the potential, to influence the profession. . . . [and to] learn how to engage in collaborative reflection on both self and peer practice in ways to improve teaching and to facilitate teacher growth” (ibid., p. 96). These assertions raise the status of the teacher’s role in the direction of professional development and they highlight the central role that peers can learn to play as critical friends.

By contrast, ‘coach’ implies that one is more expert or knowledgeable. Hargreaves’ (2012) vision of joint practice development dismisses the notion of unilateral practice transfer and instead frames it as a co-construction of practice that entails incremental innovation, of fundamental importance for sustainability. However the terms coach, donor and recipient – rejected by participating teachers themselves (Sebba, et al., 2012) – are used by Hargreaves in describing how through mutual observation and coaching the donor reflects further on the practice that is being shared and explores ways in which it can be improved. The recipient can also contribute as an act of reciprocity.

Reflective practice takes a range of forms too. In Schön’s (1991) “reflection-in-action” the practitioner engages in dialogue with someone whose different perspective could help to reframe an underlying problem. Handscomb and MacBeath (2004) consider that reflective practice is a public, evidence-based activity demanding the systematic collection and analysis of data. Pollard (2005) claims that it leads to a “higher standard” of teaching and stipulates that it includes engaging with the relevant academic literature. This most rigorous form of reflective practice is also more time consuming, requiring resources that many practitioners on their own may find difficult to access. This is one area in which a research partnership between classroom and university educators may prove fruitful.

Some support for this assertion comes from the model of ‘knowledge communities’ which assumes that links between research and practice are established in professional networks that have the aims of making the participants – a group of people sharing an interest or passion – profit from each other’s expertise, and of generating new knowledge (Wenger, 1998).

Collaboration may be carried out via the Internet or face-to-face, on a small scale or on a large scale, intensively or less intensively, in a formal or in an informal way, directed locally or centrally, and so forth. Diverse professional groups may participate, including researchers, teachers, policy-makers, mediators and/or funders of research. Basically, mutual influence of research and practice will be the most effective when the collaboration is intensive, the professional background of participants is heterogeneous, and the activities concern not only the exchange of knowledge but also activities in boundary-crossing practices. (Broekkamp & van Hout-Wolters, 2007, p. 210)
A growing body of work focuses on collaboration between classroom practitioners and university researchers as a powerful vehicle for pedagogical change – in ways that more closely integrate theory and rethinking of practice (Baumfield & Butterworth, 2007; Darling-Hammond, 1994). For example, in interactive “co-learning” agreements between university researchers and practitioners, both parties work towards improving practice. Both act as agents of (reflexive) inquiry, actively participating in rigorous analysis, contributing interpretative insights and re-negotiating their perspectives – within a carefully constructed framework of trust (Edwards & Jones, 2003, p. 431; Wagner, 1997). Similarly, partnership with university colleagues with a “traditional commitment to knowledge production and criticality” helps to “engage practitioners in the sorts of thinking they value and need . . . [especially in] “bouncing ideas off others” (Triggs & John, 2004, p. 436) and deliberating on their practice. But to be effective, university–school research partnerships require mutual benefits and a genuine coalition of interest (C. McLaughlin, Black-Hawkins, Brindley, McIntyre, & Taber, 2006). They necessitate the critique of subconscious discourses operating in practice, and a deep involvement in exploring how practice influences pupils’ learning (Cordingley, 2004; Dawes, 2001; Rathgen, 2006).

In one unusually long and fruitful partnership (spanning over 40 years) between university science educators, their student teachers and a local school district, its extraordinary success is attributed largely to the creation of a culture of ongoing co-inquiry (Marek & Laubach, 2007). In this partnership prospective teachers are apprenticed within a theoretical orientation to inquiry-based science teaching. The school teachers practice in their classrooms constructivist learning theories and learning cycle methodologies (exploration, concept development, content expansion and reading about it) that pre-service teachers study at the university; thus the science classrooms are “living laboratories” for teacher preparation at the university, supported by a common theory base.

Another attempt to infuse theory into practice was a professional development model tested by Butler, Lauscher, Jarvis-Selinger and Beckingham (2004). This exposed teachers to principles concerning self-regulated student learning, through modelling, workshops, intensive classroom support, feedback and reflection. They consequently shifted their questioning techniques and interaction patterns with students. They considered the new theoretical concepts and language they adopted and personalised to be crucial in effecting change. The researchers described the framework as a “guiding light” (ibid, p. 451) but stressed the danger of dependence on “outsiders” for sustaining an innovation. They also linked teacher learning with emerging “reconstructed conceptual frameworks” but no details of reconstruction or adaptation were presented. The findings have some implications for our own studies, although we did not provide classroom support; instead we examined whether the scholarly theory introduced had any subsequent use as a tool for characterising teacher thinking about pedagogy. This process is elaborated as follows.
In our research partnerships, we set out to understand, question, deconstruct, and later to develop, classroom practice through university researchers and teachers acting as co-inquirers and engaging in collaborative theory building. Our aim was to co-construct or jointly build accounts of practice and underlying pedagogical strategies that could be shared with both teacher and academic colleagues. This approach, like the ones noted above, is a kind of “reciprocal partnership” that respects the teacher’s “voice” and often untapped and undervalued expertise (Elden, 1981; Fisler & Firestone, 2006; C. McLaughlin, et al., 2006; Rathgen, 2006). Likewise, “co-teaching” and its underpinning, “co-generative dialogue”, aim to collectively generate a discourse for explaining classroom events and designing changes (Tobin & Roth, 2007). This is effected through sharing responsibility for extending explicit and implicit learning opportunities for pupils and co-teachers. Our approach differs somewhat from ‘coaching’ models, for example Content-Focused Coaching (Staub, 2004). Both approaches include

- pre-lesson planning conferences;
- the enactment of lessons or invisible translation of pedagogical beliefs into action (Zwart, et al., 2007);
- post-lesson reflection conferences;
- theory-guided reflection conferences focused on student learning and core pedagogical issues.

However, a coach is considered to be co-accountable for the design and enactment of lessons; in our studies that remained the teacher’s responsibility.

I am mindful of Triggs and John’s (2004) assertion that educational research often reflects asymmetrical power relations whereby academics use practitioners as the objects of research. However, I believe that our own collegial research partnership models a very different power structure. It also represents a significant departure from conventional action research that is carried out by practitioners, and from the traditional “gather data” and “deliver knowledge” approach that characterises most academic research.

Our approach to collaborative theory building was also derived from our previous experience of working with teacher–researchers. During the TIPS (“Technology-Integrated Pedagogical Strategies”) project, 15 teacher–researchers tried out new pedagogical approaches to using technology in a range of subject areas over the course of a year. First they were encouraged to make explicit their practical theories for how a technology supported learning and guided the development of a pedagogical strategy incorporating its classroom use, then they evaluated their theories in practice (Deaney, Ruthven, & Hennessy, 2006). The study showed that teachers’ initial ideas were often modified when operating within the constraints of the setting. Their speculative theories about idealised use of technology were tempered through practice by their own beliefs about how pupils learn and about “what works” (pedagogically and technically) in the specific setting. This craft knowledge (Cooper & McIntyre, 1996) is concrete, detailed knowledge developed
DEVELOPING A FRAMEWORK FOR PARTNERSHIP

and stored in relation to specific learner, classroom and activity contexts, and accessed for use in similar situations. In this study, craft knowledge was shaped by the perceived constraints and affordances of the setting, by resources at hand, and by trial and adaptation of practice. Developing practical theory could thus be viewed as a complex and evolving process of reciprocal interaction with the setting and with associated craft knowledge (Hiebert, et al., 2002).

During each TIPS project, two lesson observations and post-lesson interviews were carried out. The interview discussions were designed to help teacher–researchers articulate some of the thinking behind their developing practice. They found it difficult, however, to move beyond a general and superficial account of practical theory, both initially and in their written reports – despite the support and models provided. Hence the researchers’ analyses of classroom action in relation to practical theory remained interpretative.

The design of the subsequent ‘T-MEDIA’ research project was therefore guided by the lessons emerging from TIPS and other models of teacher development (Clarke & Hollingsworth, 2002). Collegial interactions and external input from the university team were central. While these focused on research mentoring in the case of TIPS, T-MEDIA involved introducing and discussing theory quite explicitly, as elaborated in the next section. Recognising that synthesising research-based knowledge with teachers’ craft knowledge demands “time, energy and helpful procedures” (McIntyre, 2005, p. 362), we sought to find ways to structure and promote “quality conversations” focused on the specifics of teaching and to set up contexts in which “rigorous and critical debate” can happen (Wallace, 2003, pp. 11–12). We therefore planned a series of intensive workshops and meetings conducted away from school sites (at the university): an approach that “affords [teachers] the luxury of exploring ideas without worrying about what they are going to do tomorrow” (Putnam & Borko, 2000, p. 6). Through the in-depth examination of digital video data, workshops were focused on the minutiae of ordinary classroom lessons, thus combining the advantages of working in both settings.

DEVELOPING INTERMEDIATE THEORY

Theory provides teachers with a frame of reference and a language for naming and critically analysing many of the problems they encounter daily. In our case, a sociocultural framework provided the initial theoretical language, constructs and lens through which to begin our analysis, and ultimately proved to be a powerful “guide to thought and instrument of interpretation” (Gordon, 2007b, p.xi). Whereas our approach to analysing classroom interactions was explicitly informed by various (subject-specific and sociocultural) literature, the aim was to engage in “problematising” (Freire, 1976) – to engage, in other words, in dialogue centred around explaining the data. This brought together the academics’ scholarly knowledge, derived from existing theory, research findings and experience, with expert teachers’ practical theories (Deaney, et al., 2006) and their extensive,
SECTION ONE INTRODUCTION

professional craft knowledge. The main goal of the research collaboration was the joint construction of an analytic framework that elicited and codified the explicit, implicit, initial and evolving theories and expectations of the different individuals involved. Through joint reflection on specific classroom experiences, we aimed to represent and understand them in new, grounded, and detailed ways that were helpful for all team members and for other practitioners and researchers.

We understand that although sociocultural learning theory may broadly frame an educational practice, it does not bridge directly to it; grand theory lacks orientation to particular contingencies and tends to pass over important details. Indeed, learning theories – and intervention programs aligned with them – require significant adaptation to local resources and constraints if they are to inform practice; they cannot simply be exported or disseminated to new settings. In looking at teacher learning, we extrapolate from the use of a much more flexible form of “transfer” from the extensive review by Bransford and Schwartz (1999) of empirical work in the field of student learning. This is based on “preparing for future learning” through analysing contrasting cases, building on learners’ own ideas, helping teachers to critically scrutinise and clarify their own thinking, and to actively change the given situation according to their current state and goals. Important prerequisites include support for innovative risk taking in an authentic inquiry environment and opportunities to receive feedback and to improve practice. This is linked in turn with a supportive disposition characterised by willingness to question and relinquish one’s own assumptions and to seek others’ ideas and perspectives (Bransford & Schwartz, 1999). All of the participants in the studies reported here were willing to do this and to take what Stenhouse (1975, p. 156) called a “research stance”: namely, “a disposition to examine one’s own practice critically and systematically” in the interests of personal development. Bransford and Schwartz point out that usefulness of this approach shows up only when people are given the opportunity to learn new information. They argue the case for investing time and energy in developing adaptive rather than substantive expertise (for example, helping people learn a particular software package is contrasted with taking the extra time to prepare them to continually learn new packages).

The notion of “travel” proposed by the US National Academy of Education in their specification of research priorities (NAE (National Academy of Education), 1999) likewise suggests that

Broad use is more likely to be achieved if we learn how to develop resources that are intended for other people’s use of innovative programs as models that they can adapt to their own circumstances, rather than striving for universally true, abstract propositions. (Greeno, 2004, p. 8)

The shift away from the ambiguous term “transfer” is welcome, and the stance taken in the work reported here is related. I prefer, however, to speak of “pedagogical principles” (any or all of which may be appropriated and trialled in new settings, where their manifestations will look rather different) rather than “programmes”
or “models” (albeit adaptable ones). The latter terms hold less situated and more prescriptive connotations, including an assumption of adoption or adaptation of the whole. My stance is consistent with the assertion of Randi and Corno (2007, pp. 336–337): that any number of interventions might be designed to embody a particular theory and thus using multiple examples may ultimately help teachers to abstract the general principles underlying the theory.

The process of intermediate theory building could indeed be viewed as a form of Randi and Corno’s (2007) “conceptual theory mapping”. This is an inductive process of theory validation in which teachers adopt and adapt applications of theory-based principles that fit their learners’ needs as they arise. This might take the form, for example, of developing self-regulated learning experiences that guide pupils to model their work habits on lessons learned from the literature. It is a kind of “forward reasoning” (Perkins & Salomon, 1989), and it stands in contrast to the faithful application of a theory-based intervention to practice.

Instead, teachers appropriate scholarly ideas into their practical reasoning in a manner that provides a new context for research. The research examines how the theory maps broadly to content across existing curricula, domains, disciplines or teaching situations. This gives the theory credence by demonstrating its external validity. Our approach likewise offers practitioners professional autonomy and the opportunity to be adaptive and inventive, aligning their practices and approaches with aspects of theory they themselves deem relevant and refining them accordingly, purposefully and iteratively (Bransford & Schwartz, 1999). The ultimate goals of our intermediate theory-building process were to exploit insights from research (a) to help describe, understand, critique and learn from observed classroom practice; (b) to guide principled development of new practices and pedagogies; and (c) to refine both practical and grand theory. I describe below how we tested the boundaries of both a priori practical theory and grand theory through micro-analysis of their applicability and manifestation in different practical settings and across domains, within and between taught subject areas.

Randi and Corno (2007) concluded that collaborative research by academics and practitioners is the implicit mechanism in the interplay between practice and theory, serving to collect and generate examples of theory as it plays out in practice across a variety of domains. The nature of teachers’ contribution to theory mapping demands more attention, however. Nuthall and Alton-Lee (1990) suggested that university researchers could “hand over” their theoretical and interpretive work to teachers to find applications for theory in practice. In this way, teachers’ findings would become part of the research process and be used first in the development of grounded theory before it is tested empirically. Examples generated in practice might subsequently be used to develop, refine, and elaborate theory, precisely as they were in our studies.

This evolving, cross-validated theory becomes the substance of what is reported to teachers, with specific findings being embedded in the theory only as illustrative and practical examples of the theory in action in specific
SECTION ONE INTRODUCTION

contexts. Teachers can then take the theory, grounded as it must be in classroom activities, and try it out in their own classrooms, knowing that they are also engaging in further research (ibid., p. 565). In this iterative fashion, the findings of classroom research become “embedded in an evolving explanatory theory of classroom learning that is of practical value to teachers” (ibid., p. 547), giving the research “pragmatic validity” Nuthall (2004, p. 273).

Hiebert et al. (2002), discussing “A knowledge base for the teaching profession: what would it look like and how can we get one?” propose creating space for a new set of professional development opportunities for teachers and a new means of producing and verifying professional knowledge.

Teachers would be able to employ the methods of replication and observation across multiple trials to produce rigorous tests of quality and effects. Sometimes they would test practices developed by other teachers, and sometimes they would test ideas generated in the research community. Over time, the observations and replications of teachers in the schools would become a common pathway through which promising ideas were tested and refined before they found their way into the nation’s classrooms. And, as intentions became reality in classrooms, a new kind of knowledge about improving classroom practice would emerge, a knowledge that would accumulate into a professional knowledge base for teaching and continuing improvement in teaching. (ibid., p. 12)

However, others have highlighted the limitations of practitioner knowledge derived in this way. For example, Nuthall (2004) argues that it is difficult for teachers to access evidence about the learning of their pupils and to gain insights into how (often invisible and complex) learning processes occur through interaction with their teaching. Simplistic assumptions that teaching leads to learning need to be superseded by an explanatory theory of underlying mechanisms – how different ways of managing the classroom and creating, supporting and assessing activities are related to learning outcomes; what are the influences of learners’ prior experiences, beliefs, motivations and peer interactions; and so on. Teasing apart the myriad of (often interdependent) contextual influences and attributing causality offers a major challenge.

Likewise, intervention programmes (including some design-based research) are often evaluated as a whole so that precisely what aspects of the intervention were directly related to learning, and how individuals responded, remain unidentified. As Nuthall (2004) points out, these are just what a teacher needs to know in order to use the programme subsequently in an intelligent and context-sensitive way. Yet the kinds of detailed and ongoing observation and recording of individual pupil experience are unrealistic for teachers to carry out alone. Objectivity can be elusive too; for instance, teachers can only see the classroom through their own eyes and are often unaware of a mismatch between their stated beliefs and their practice, or of the enormous influence that their own expectations can have upon learners.
DEVELOPING A FRAMEWORK FOR PARTNERSHIP

In sum, Nuthall (2004) argues that individual case studies of teaching, whether carried out in action by teachers or by outsiders, are incomplete until they are replicated in a variety of different contexts, with different curriculum content, different kinds of learners, and so on. Only then can they lead to the kind of generalisable explanatory theory that teachers need to guide their own practice. Such studies allow us to distinguish both what is unique to a specific context and what is generalisable across many contexts.

While individual case studies and narrative accounts are a rich source of new ideas and potentially valuable insights, scholars must move on to studies that can produce knowledge which is both more practical and theoretical, more profound and generalizable (Nuthall, 2004, p. 300).

Accordingly, we draw on the idea of an intermediate theoretical scope (diSessa, 1991) that is located – and serves as a bridge – between specific setting and grand theory, specifying the conditions in which theory applies. This is a characteristic of design-based research methodology (not employed here, although there are some commonalities, including a form of mindful transfer: Randi & Corno, 2007) where reflection and theory building may occur at an intermediate level of analysis, namely one focusing attention on the pathways connecting learning theory and practice (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003). Grounding theory in practice in this way helps to articulate the design and its instantiation, and informs its modification, though the research cycle is probably less likely in turn to directly inform or to challenge grand theory. The notion of intermediate theory in this project was developed through coordinating and accommodating to the different purposes and perspectives of university researchers and teachers, and engaging with each other’s practices.

In this approach, ideas embedded in theory are introduced to the teachers provisionally rather than prescriptively (Alexander, 1984; McIntyre, 2005; Stenhouse, 1975). The intention is for them then to be recontextualised, verified or iteratively refined. Rather than embracing theory wholesale and attempting to use it directly to inform practice, we seek to adapt elements of the theory to fit the diverse classroom contexts selected as its testbed. To conclude, intermediate theory building is not an abstract consensus-building exercise; rather, it necessitates setting up a practical arena for testing out a synthesis of a priori practical theory and selected elements of grand theory in relation to technology-supported activity. It includes recognising challenges, dilemmas, and situational constraints, and then developing practical strategies for addressing them (Marx, et al., 1998).

Using Collaborative Review of Lesson Videos

Opportunities for teachers to observe each other’s practices at first hand are still comparatively rare (Day & Sachs, 2004; Pedder, James, & MacBeath, 2005) but digital video offers a means of both capturing and revisiting authentic classroom
SECTION ONE INTRODUCTION

activity. This technology has recently become established as a powerful tool for critical reflection and knowledge construction. A body of literature describes the transformation of meaning making into a public and shared experience through a process of cultural change in which participants exchange their viewpoints and interpretations (Goldman, 2004; Powell, Francisco, & Maher, 2003; Sheard & Harrison, 2005; Sorensen, Newton, & Harrison, 2006). Armstrong and Curran (2006, p. 11) concluded, further, that through jointly analysing video data, “teachers are able to develop new ways of thinking … which can immediately feed back into actual teaching situations”. Similarly, cogenerative dialoguing – collective generation of local theory about classroom events – “produces recommendations for [imminent] concrete actions and change that teachers experience as an opening of their possibilities” (Roth & Tobin, 2004, p. 175).

Digital video recording and review was therefore selected (as part of a range of mixed methods) as the tool most suited to supporting our process of co-inquiry. The issues related to this tool are explored throughout the book, beginning in the methods Chapter 1 where the discussion includes the added complexity of using video, the pros and cons of using records of teachers’ own lessons versus those of strangers, and the use of video clips to support professional development.

In our research, the video review meetings were employed as – and proved to be – a powerful catalyst for teacher introspection. The extensive scheduled discussions of both lesson plans and the various forms of data (see details in Chapter 1) were intended to create the critical space whereby “craft knowledge can legitimately come under respectful forms of examination comparable to those applied to scholarly knowledge” (Ruthven, 2002, p. 589). We use the term ‘applied practical theory’ to describe this synergy. This conceptualisation assumes that practical theory is situated in local, authentic pedagogical practices, perhaps related to specific learner groups, too, and that it evolves through adaptation to particular settings of use. An article by Ruthven, Hennessy and Deaney (2008) on the interpretative flexibility of (dynamic geometry) software elaborates the process by which conceptions of a technology develop during both the evolution of its design and its appropriation as a functional tool, to become aligned with user concerns. Other recent work by de Freitas et al. (2008) devised workshops for practitioners to critically evaluate given pedagogical models for technology use, and illustrates their adeptness at adapting the models to suit their own contexts. The conclusion from that study that “teachers learn to talk the talk of educationalists by making sense of the artefacts that educationalists provide” (ibid., p. 12) indicates that our related goal of collaboratively crafting intermediate theory with practitioners was not overambitious. Of course, the experienced, hand-picked teacher participants already possessed well-developed pedagogical thinking and clear rationale for using the familiar technologies chosen. It was therefore perhaps less of a leap for them than for the typical teacher to articulate the associated practical theory that had become integrated with their craft knowledge through experience of trying out approaches over time.
Two kinds of beliefs emerged during our data collection:

• continually evolving perspectives upon how interactive whiteboard (IWB) technology supported learning within specific contexts;
• more generalised, common beliefs: for example, concerning the generic IWB tool supporting visualisation of complex concepts and fostering learner participation.

These were inextricably linked to the first kind.

Along with the interviews, participant observation by the teachers through video review was essential in eliciting an accurate, in-depth account of the rationale implicit in their actions. It was additionally important in providing richer contextual information because university researchers did not know the pupils, the constraints operating or the subject matter in the way that the teachers did. The teachers possessed varied levels of experience with the hardware, software and lesson materials employed, so that some scope for testing activities and theory remained; applied practical theory thus provided a helpful starting point but was inevitably shaped and elaborated through experience of teaching the lesson sequence and of the review process.

Developing an Intermediate Theory Framework Through the Dialogic Cycle

Ruthven (2002) has articulated in some detail how craft knowledge may ultimately be brought to contribute to further development (reframing and recontextualisation) of scholarly knowledge and vice versa, with knowledge being filtered and reformulated. In our study, applied practical theory interacted with grand theory (perceived as elastic rather than deterministic) through such a dialogic cycle as university researchers and teachers built a shared understanding of the evolving theory. Multiple perspectives and interpretations were made visible, debated, systematically tested, refined and extended through an iterative process that helped establish a framework for the ongoing analysis, as documented in Lesh and Lehrer’s (2000) model of iterative video-tape analysis. The process culminated in a coding scheme and a narrative account that are framed in a common accessible language.

Triggs and John (2004) – and likewise teachers within our own schools–university research partnership (C. McLaughlin, et al., 2006) – have highlighted the importance of overcoming the language barrier if teachers are to engage with research. To address this issue, categories and overarching pedagogical themes were described using participants’ own language or in vivo codes (Strauss, 1987) for key constructs wherever possible, and definitions were elaborated using concrete examples from observed lessons. However, the more abstract, specialised terminology of social science provided a useful framework with which to structure some of our collective interpretations. Its introduction extended the teachers’ own “language of practice” (Sugrue, 2004) and offered the teacher participants an alternative language to describe their actions, which they could adopt or adapt to whatever extent they chose. Note that this was not merely a process of finding a common language to
SECTION ONE INTRODUCTION

describe mutually recognised phenomena, but one of reshaping perspectives; both university researchers and teachers saw activity in new ways and modified and refined their initial, more generalised theories. Specifically, *a priori* sociocultural theory was appropriated, extended and jointly elaborated (albeit not radically) over time – through critical reflection on its application to the context of technology use and to the specific case being studied. It was consequently integrated with practical theory and grounded in the diverse contexts in which technology is used. Our characterisation of this process acknowledges that coding is never “theoretically innocent” but is shaped by – and constantly interacts with – our prior and developing perspectives: “a theoretical frame is embedded in any research design … the main function of data collection and analysis is to make one’s underlying premises as visible as possible and to challenge and develop the initial framework” (Alasuutari, 1996, p. 372–3). The theory encapsulated within the final narrative needed to rise above highly domain-specific and pragmatic concerns to some extent if it was to be usefully applied in a range of other settings, as intended. Expression of the individual teacher’s rationale served as a set of terms of reference for co-construction of an account that transcended it.

In sum, the main objective was to couple the practices of researching and teaching in a way that would ultimately contribute to the negotiated, systematic formulation of grounded intermediate theory. The first chapter in this section outlines the methodology we developed to tackle this. The following three chapters present T-MEDIA case studies that illustrate the theory-building process and its outcomes in different subject areas, followed by a summary in Chapter 5 of the pedagogical themes emerging across subjects. Chapter 6 develops the methodological approach to theory building further through a study focusing on classroom dialogue. Chapter 7 synthesises across all of the first six chapters. It reflects further on the methodological approach to theory building via collaborative review of lesson videos, identifying preconditions, key characteristics and scalable benefits of our evolving approach.

NOTE

CHAPTER 1

RESEARCH FOCUS AND METHODOLOGY FOR COLLABORATIVELY ANALYSING PRACTICE

INTRODUCTION

Developing intermediate theory together was the primary goal of the research collaboration, as described in the Section One Introduction. The process by which we achieved that goal is outlined in this chapter and then illustrated in greater detail in each of the following case studies (Chapters 2–4) and in Chapter 6. Here I describe the methodology iteratively developed for recording and analysing our observations of 33 lessons during two separate research projects. Each of these (approximately 1-hour) lesson videos was subject to several hours of individual and collective analytic scrutiny. The initial development took place during the T-MEDIA (“Teacher Mediation of Subject Learning with ICT: A Multimedia Approach”) project carried out with colleague Rosemary Deaney, and this is described first. An account of how the methodology was refined and extended during the Dialogue and IWBs project follows.

Note that in keeping with my portrayal of the teachers as research collaborators, no attempt is made to conceal their identities – indeed three of them are co-authors of case study chapters – and they have given permission for themselves and their schools to be named. Note also that while most of the content of the accounts in the case study chapters is unsurprisingly written largely from the university researcher’s viewpoint, all participating teachers have read them and endorsed their validity, and they have contributed in various ways to the writings as well as to the research.

T-MEDIA PROJECT: RESEARCH FOCUS

The substantive focus of the T-MEDIA research was on analysing and documenting successful pedagogic strategies for exploiting use of digital technology resources: data projectors and interactive whiteboards (IWBs) in particular. Although these tools are increasingly prevalent in UK classrooms and some other countries, the underlying pedagogy is comparatively under-developed. Our primary focus was assisting teachers to make explicit the rationale behind their actions, and thereby illuminate what they construed as effective practice. The research also sought to identify relevant contextual factors and the contribution of other resources and activities, and to produce stimuli for adapting practices to new settings. Thus we did not set out to create recipes or identify models of “best practice” for replication. Rather we wanted to generate an accessible theoretical framework that might, in turn, provide teachers with a lens for reflection – active, persistent and careful consideration (Zwart, et al., 2007) – about their strategic use of such technology.
The research focused on developing understanding and articulating strategies and mechanisms (with the goal of dissemination) rather than improving the practice of case study teachers per se, as distinct from other research studies such as the InterActive Education Project’s collaborative development and evaluation of “subject design initiatives,” namely those “that focus on particular areas of the curriculum that students might normally find difficult and where a particular use of [technology] could enhance learning” (Sutherland et al., 2004, p. 413). (Our second research project, reported below, did seek to improve practice, however.)

We were also concerned with theory building, specifically focusing on teacher mediation. The research objectives centred on developing a shared analytical framework and language, identifying pedagogical strategies for making use of IWB technology effective in the specific educational context, and characterising more generalisable strategies. In summary, our aims were:

- to record, analyse and document exemplary cases of established teaching practices that integrate use of ICT in supporting subject teaching and learning at secondary level;
- to elicit, identify and represent the craft knowledge that guides teaching and learning in these cases;
- using a peer-interview technique, to stimulate pupils involved in these cases to articulate, and reflect on, their ideas about how teachers successfully mediate use of ICT and how this supports their learning; to feed these back to teachers;
- in collaboration with practitioners, to draw on and extend sociocultural learning theory so as to develop a theoretically guided model of teacher mediation of activity to support learning with technology;
- to compile and disseminate annotated audiovisual accounts providing replicable exemplars of practice.

These aims were achieved through a phased process of video review using a clearly formulated set of criteria for identifying key episodes and eliciting the rationale underlying the practice depicted. Additionally, feedback was sought from the teacher and pupils during a series of interviews and meetings. Lesh and Lehrer (2008) warn that many projects ultimately collect far too much video footage and spend far too little time interpreting the data. We addressed this by engaging in in-depth critical scrutiny and discussion of each lesson video and related data, in conjunction with participating practitioners. While we, the academic researchers, initially formulated the project proposal, the teachers and a departmental colleague in each case collaborated with us throughout the stages of data collection, analysis and validation and development of multimedia outcomes. Thus the eight teachers made a significant and sustained commitment to act as our co-investigators in this “participatory” research (Elden, 1981) over its 30-month timespan. Crucially, all of their time was funded by the project. One or two volunteer academic subject specialists per case also viewed the videos and offered independent input.
The video review process involved: exposure of teachers to key constructs from sociocultural theory, allowing them to select, appropriate and apply relevant notions using their own language where desired; supporting initial alignment of all participants in terms of key ideas and subsequent negotiation of an analytic account; collaborative development of graphical representations of the central themes in each case and connections between them.

The key research questions relating to developing grounded intermediate theory were:

• To what extent would the teachers filmed and their participating colleagues be willing and able to engage with the theory-building process?
• How might we build a partnership where university researchers were “neither the legislators of practice nor the dispensers of wisdom” (Boostrom, Hansen, & Jackson, 1993, p. 43) and what are its defining features?

T-MEDIA PROJECT: METHOD

Participants and Roles

Four UK teachers, one in each of four secondary subject areas – English, mathematics, science and history – took part in the research. The teachers were all experienced, reflective practitioners who had previously been involved in our research. Lloyd Brown was a history teacher of some 25 years standing and was Head of Humanities at the time. Jackie Bullock had taught English and Drama for 10 years at the time of the study; she was Head of Year and responsible for developing technology within English. Chris Tooley worked as an Advanced Skills Teacher and was designated by the county as a leading science teacher in relation to his extensive expertise with the IWB; he had taught for 15 years at the same school. These teachers’ professional profiles are described in much more detail in Chapters 2–4 where individual case studies of their practice are presented. A fourth teacher, Sarah Hampton, had taught for 8 years and was head of her mathematics department. She was committed to working with mixed groups of students across the attainment range.

All of the teachers had participated in previous research with us. Earlier interviews had yielded evidence of well-articulated pedagogy for “integral use” of technology (Dawes, 2001), and of expenditure of time and energy in developing new approaches promoting active learning and in sustaining them over time. Thus the teachers had developed the confidence, technical and pedagogical skills for using technology systematically, appropriately and effectively in their everyday practice. One teacher (mathematics) used a data projector, whereas the other three had permanent access to an IWB in their classrooms. Moreover the teachers were willing to take a critical “research stance” (Stenhouse, 1975, p. 156).

Each teacher worked with a colleague they had selected from their subject department – a like-minded teacher who was both interested in the research and...
an enthusiastic user of technology in their own classroom (again detailed profiles are available in Chapters 2–4). The colleagues were not filmed but took part in the planning process to some extent and then played a full role in the analysis process. Thus all eight teachers acted as classroom educators, subject specialists, and teacher–researchers in this study. The four main teachers’ classes of pupils (aged 12–15) were participants as well, being filmed and interviewed about their learning experiences. The classes were designated heterogenous (mixed levels of attainment) or homogenous (low to middle attaining) groupings within each subject.

The three schools to which the teachers and pupils belonged encompassed a range of typical settings and social backgrounds. All were state-funded, mixed 11–16 colleges within a 25-mile radius of the city of Cambridge (UK) and had some nationally recognised form of specialist subject status. Two of the three schools involved were members of our local schools–university research partnership, whose established tradition of academics supporting teacher research channel for schools–university partnership previous over the previous decade was detailed by McLaughlin, Black-Hawkins, Brindley, McIntyre and Taber (2006).

Other participants in the research collaboration were the two university researchers who initially conceived the focus, design and methodology of the project when securing its funding. The subsequent process of collaborative decision making – involving the university researchers and two teachers in each case – began with lesson planning (negotiating only aspects such as selection of pupil group, topic, technology). It continued throughout the stages of data collection, thematic analysis and validation, and development of multimedia outcomes and culminated in some joint reports and conference presentations.

In each case we also involved at least one volunteer academic subject specialist (two each in history and mathematics). Five came from our university faculty and one from another institution; all had extensive teacher education experience. Their role was primarily to view and comment on the observational data from a subject perspective and in light of wider practice with which they were familiar. The details of each of these participant roles in the collaborative analysis and development work are elaborated below.

Data Collection

The investigation took an in-depth case study approach; we observed and video-recorded each class over six lessons (plus one pilot/acclimatisation session), recording 24 lessons in total. The main (mobile) video camera was positioned on a tripod, usually at the back of the classroom to minimise intrusion, and followed the teacher. It was operated by a professional cameraman, directed by the researcher. A (fixed) second camera at the front captured children’s faces when answering questions etc.

A total of four (semi-structured) teacher interviews (one during planning, two post-lesson, one follow-up) were carried out using printed prompt cards (see
Appendices 1–4). These were audio recorded, and transcribed. Learner perceptions were solicited using focus-group interviews (see Appendix 5); two pupils were trained to interview mixed-sex groups of six of their classmates (randomly chosen by the teacher) after the third and final lessons in each study, again using prompt cards. Copies of pupil work and all lesson materials and outlines were collected, screen displays and annotations were captured and digital photographs were taken. Additionally, each teacher kept an unstructured diary recording their planning and decision-making processes and, in most cases, post-lesson reflections. The two university researchers each took responsibility for two case studies, conducting all of the observations, interviews and meetings, and preparing the data. British Educational Research Association ethical guidelines were followed throughout the study, particularly with respect to responsibility to participants and obtaining informed consent. All pupil names have been changed.

The specific practices we investigated included use of the IWB in science for learning about the photosynthesis process in Year 10 (age 14–15); constructing collective interpretations of poetry with an ‘anti-social’ theme in English with Year 10, using the IWB; use of multiple technological resources including the IWB in history to support analysis of evidence concerning the “golden age of Elizabeth I” in Year 8 (age 12–13); using dynamic graphing software with a data projector and laptops to teach the concepts of intercept and gradient in linear functions in Year 8.

**Collaborative Video Review and Professional Development Material Production**

The use of classroom video built upon the growing consensus in the literature that professional development activities need to be located in the familiar, everyday practice of teaching. Outside the classroom this can mean drawing on tangible artefacts such as lesson plans, curriculum documents, schemes of work, pupil work and purposefully selected clips from lesson video recordings to focus attention on specific aspects of classroom practice and interaction (Borko, Jacobs, Eiteljorg, & Pittman, 2008), as in the research reported here. Video records are particularly valuable in highlighting aspects of classroom life that a teacher might not notice while carrying out a lesson, and can capture the ethos of a classroom (Clarke & Hollingsworth, 2002). Using external microphones moreover makes it possible to record small-group interactions and teachers’ conversations with individual learners that are not typically available to an observer, and of course to replay and pause the tapes at critical points for discussion, permitting reflection at a “leisurely and thoughtful pace” (Borko, et al., 2008, p. 420). Video also captures the important elements of an approach for the benefit of practitioners in other settings; it enables a new approach to be studied and adapted more easily at new sites.

Repeated viewings of video…offer the “opportunity to analyse teaching in ways that are very different from the types of practices and responsibilities that are usually a part of teachers’ daily work. In particular, video allows one
CHAPTER 1

to enter the world of the classroom without having to be in the position of teaching in-the-moment and to manipulate that world in ways not possible without the video record. (Sherin, 2007, p. 13)

In order to achieve joint, negotiated understanding of the classroom activity being reviewed, the whole team was actively involved in an iterative cycle of analysis through discussion that included scrutiny and categorisation of strategies and interactions within and across lessons. This entailed extracting and cross-checking analytic categories, posing conjectures and testing interpretations across episodes, theory building, identifying and formatting exemplars for dissemination, and generating tools for reflection for others within the subject area. It comprised a phased process of individual review and joint meetings after completion of the lesson series (see Table 1.1).

**Phase 1: Individual video review.** A time-coded descriptive summary of the videoed lesson activities and interactions (with significant utterances transcribed verbatim) was produced by the university research team and incorporated in a grid for each lesson, containing one column per team member (see Figure 1.2). All members of the team used this, alongside the video, to familiarise themselves with the lessons, to reflect, and to comment independently. As in the study described by Armstrong and Curran (2006), providing unedited video footage on CDs allowed repeated playback in the viewer’s own time.

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<thead>
<tr>
<th>Phase</th>
<th>Activities</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>1</td>
<td>Preparation of review materials, independent video review using timeline grids, selection and provisional categorisation of critical episodes</td>
<td>Video summaries, analytic commentary &amp; questions regarding pedagogic rationale, thematic codes</td>
</tr>
<tr>
<td>2</td>
<td>Collation of combined grids, systematic integration with other data, independent review</td>
<td>Instances of converging &amp; diverging perspectives, points for discussion</td>
</tr>
<tr>
<td>3</td>
<td>Video review meetings, scrutiny of critical episodes, negotiation of emerging themes</td>
<td>Identification of main strategies and themes, linked to theory and practice; concrete exemplars of these; revised coding scheme</td>
</tr>
<tr>
<td>4</td>
<td>Systematic computer coding of all qualitative data, further analytical review and follow-up teacher interview</td>
<td>Illustrated thematic storyline for each case, an overarching account</td>
</tr>
<tr>
<td>5</td>
<td>Final selection and trialling of lesson video clips and associated analytic commentary, identification of issues for viewer reflection</td>
<td>Five CD-ROMs illustrating themes and strategies emerging within and across cases, and offering tools for professional development</td>
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</table>
### RESEARCH FOCUS AND METHODOLOGY

#### Video Summary

<table>
<thead>
<tr>
<th>Start</th>
<th>End</th>
<th>Video Summary</th>
<th>Teacher</th>
<th>Colleague</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:13:59</td>
<td>0:21:11</td>
<td>T projects a possible technique and a question (with examples from poems). T: Here are some suggestions to start you off. Pick up your pens and in your mind think, 'I know who I’m writing from the point of view of, I’m not me anymore'. T continues making suggestions for the persona and reasoning behind their thoughts/actions. Maybe they are trying to prove something to the world... have been let down... Ps should think about where persona is and what has happened in his life. T talks through slide and examples to illustrate techniques.</td>
<td>T anticipates difficulty starting poem. Speaks in 1st person as if they are the persona – transferring thinking in this way to class. T prompting Ps to write specific type of poem. Very real examples given orally with support provided visually.</td>
<td>This slide provides further ideas and T constantly challenges Ps to think by giving examples for them to work with. This helps those who will be struggling without singling them out. All Ps seem engaged. T circulates constantly giving ideas and feedback.</td>
</tr>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Figure 1.1. Excerpt from English Lesson 6 combined grid.**
The teacher interview and diary excerpts below elaborate the teacher’s rationale.

**Diary:** It was important to establish a comfortable and relaxed environment for the writing process to begin so I didn’t want to ‘intrude’ into the lesson too much but still wanted to scaffold the writing process for those students who would undoubtedly need help. The SmartFiles I produced contained sufficient structure for the majority of the class to start writing immediately – the examples of how the poems studied had begun, were presented visually and orally as I know that some students would pick up on what I was saying rather than looking at the board. The SmartFiles were not intrusive as they were always there in the background.

**Interview:** Really what I did was just look back at those three poems and picked out the ways that some of them started or the ways that they were developed, the types of mood. . . and the way that they’ve resolved their discussion of a topic. So. . . those slides were. . . prompting them: you know imagine you’re the speaker, you’re really irritated, what is it that’s irritated you? [. . .] I used it as a scaffold, as a structure for them so they could use as much or as little of it as they wanted to. . . it was really just about giving them ideas. . . ‘we’ve done this already, remember? You commented upon the effects of the alliteration and the metaphors, now’s the time to have a go at just using them.’

Impressions were recorded through written commentary and preliminary selection of **critical episodes** (see Powell, et al., 2003, p. 416, on “critical events” or “connected sequences of utterances and actions that, within the context of a priori or a posteriori research questions, require explanation”). Critical episodes were defined as actions, teacher interventions, or pupil-initiated interactions that were key in using technology effectively and/or promoting learning of the topic. These episodes were identified by all team members independently at this stage. Analytic commentary described what key part the technology and the teacher played; the effectiveness of the supporting teaching approach or strategy in terms of pupil response, learning or motivation; the level of learner participation (cognitive or physical – e.g. expressing ideas, articulating and representing developing knowledge, receiving feedback); whether and how peer interactions appeared to be supporting learning; key contributory contextual and other factors that seemed to have a positive or negative impact on successful use of the technology; and how lesson activities or teaching and learning interactions related to prior or subsequent use of technology within the lesson series.7

The university researchers and the teacher–colleague noted on the grid questions for further discussion with the teacher during the subsequent review meetings. Questions posed were carefully formulated to avoid bias or value judgment, stimulating rather than presenting insights (Lyle, 2003). For example, one question read: “Why did you give out paper copies of the diary text when it was also displayed on the IWB?” The questions were intended to clarify the teacher’s rationale for a particular action or interaction, the underlying curriculum objectives, or views about the unique contribution of the technology, or to elicit further contextual information.
Likewise the subject specialist(s) viewed the videos and made independent input at this stage on their own grid copies. Critical commentary from these academic colleagues with specialist subject knowledge and extensive experience of teacher development offered additional detailed insights. It served to relate the observations pertaining to use of a relatively new technology to a wider context of subject teaching using technology, and to suggest alternative potential approaches. Significantly, this colleague was an impartial observer and thus able to pose probing questions indirectly (usually in writing) to the teachers for their subsequent response and clarification (the form and degree of specialist input was flexible and varied).

**Phase 2: Collation of individual video reviews.** In preparation for whole-team discussions, four individual review grids were collated and combined in a single document for each of the lessons. These were then integrated with relevant excerpts from the other observational data collected. Review of the combined grids, selected clips and other data, and of the inherent degree of consensus, took place independently by teacher, colleague and university researchers.

**Phase 3: Collaborative analysis.** A series of four 3-hour meetings was held at the university over about 2 months, where perspectives were compared and integrated. The first three meetings treated individual lessons systematically in turn whereas the final meeting identified themes prominent across the whole lesson module (emerging patterns, generalisations, comparisons). Discussions were audio-recorded and transcribed so as to document the evolving shared interpretations. Lesson videos were available throughout for joint viewing on a laptop computer for reference to additional corroborative and contrasting examples. One subject specialist joined a review meeting (having observed in person one of the lessons discussed). Specialists’ written commentary was circulated beforehand. A key aim of these meetings was to discuss what made the tentatively identified critical episodes more or less significant (attending to commonalities and differences of choice or view between reviewers). Initial impressions were verified by subsequent scrutiny, or abandoned through consensus in favour of alternative explanations. Ultimately we agreed on a shared set of episodes.

After the team had commented on the first two lessons but before the first meeting, the university researchers circulated a glossary document (see Appendix 6) summarising and contrasting theories of learning, and elaborating some of the central constructs embodied in one framework, that of sociocultural theory. These related to teacher mediation and included terms not typically familiar to teachers because they derive from theoretical research, including for example **scaffolding, fading, zone of proximal development, assistive questioning, affordances,** and **focusing.** For example, definitions of two terms were:

- **Funnelling / authoritative interaction** – interaction (pupils giving responses or making contributions) but teacher leading pupils towards target response
or particular interpretation / understanding / solution, by controlling decision making (Bauersfeld, 1988) or guiding via question-and-answer (Mortimer & Scott, 2003).

**Dialogic interaction** – discussion-based discourse in which teacher recognises and clarifies pupils’ existing understandings and builds upon these to formulate joint understanding (Mortimer & Scott, 2003); intentional sharing / exploration of ideas, collaborative meaning making (learners contributing ideas, teachers helping take ideas forward); may involve open-ended questioning, talking through answers, reflecting, interpreting, evaluating.

These theoretical concepts and ideas were additionally encapsulated within a set of preliminary deductive codes generated by the university researchers during analysis of the preceding T-MEDIA case study, and initially derived from our previous analysis of teacher mediation during the TIPS project (Hennessy, et al., 2005). They were illustrated with examples of strategies from the teacher’s own (first two) lessons. Teachers found this helpful, because, as one described,

> It’s very difficult to suddenly think of a word for a concept or an idea that you are putting into practice. The scaffolding was easy because we are used to that and we do that all time, but some of the other terms would have been quite difficult for us to think of.

However, their own ideas resonated closely with some of the terms. For instance another teacher described *funnelling* as “a fantastic word for a very complex, long-winded, rambling description of something that happened”. She explained how

> the way we were describing things was in sort of teacher speak, and in ways that were familiar to us, and then [you two] were using academic research terms that were very, very similar. … looking at the same thing from two different angles I found interesting. And it kind of gives what you do in the classroom a bit more status.

The provisional coding scheme was discussed and revised at the first meeting, then used as a foundation for collaborative construction and refinement of the analytic framework. The university researchers stressed that coding is not a blueprint but something to be tinkered with endlessly until we have a framework that everyone is happy to work with, depicting our collective understanding of what was happening on the film. It was continually refined as new, inductive codes were generated and integrated, the meanings of both kinds of codes were negotiated, and their degree of fit with the data assessed. Thematic organisation therefore involved a complex, recursive process of constant comparison (Glaser & Strauss, 1967). Revision of the coding scheme took place at each meeting, with close reference to examples in the grids, until a final draft was agreed. The categorisation ultimately described processes of advance planning and classroom interaction that were linked with carefully specified conditions and consequences, as illustrated below.
Finally, the team identified overarching themes and potential exemplars of these for dissemination, making clear the selection criteria and negotiating the content and structure of the final CD-ROM for each subject. This process included generating questions for other teachers to consider (concerning ways of making use of the technology more effective) and discussion of applicability to other contexts, topics and pupil groups.

It is important to note that a very labour-intensive component of Phases 1–3 was the preparation and timely distribution of materials to all team members, which proved critically important in supporting the process of joint data review. This involved the project secretary and the lead researcher for the particular case study in summarising or transcribing meeting notes, interviews and videos; continually liaising with the teachers to obtain materials such as IWB slides, lesson plans and handouts; formulating, piloting and revising the instruments, observation records, commentary grids, glossary, video review guidelines; collating, checking and integrating the various data sources (e.g. observation notes, video summary and IWB slides / nondigital whiteboard representations were systematically combined for every lesson); and cataloguing and tracking distribution of the materials comprising a multimedia database for each case (an extended version of the “video portfolios” employed by Maher & Martino, 1996). Phased distribution of materials and review of data from 1–3 lessons between meetings helped to avoid overwhelming team members unduly with a large volume of data. Timing was also engineered so that interview data, diary excerpts, and specialist comments for a specific lesson were circulated by the lead researcher only after all team members had commented on the grid (so as to maintain rigour and avoid influencing perceptions), but before the relevant review meeting so that there was time for perusal. Finally, having enough uninterrupted (i.e. project-funded) time for the informal meeting discussions proved critical, as elaborated in Chapter 7.

Phase 4: Integration and coding of all data sources. This was carried out by the university research team using HyperResearchTM 2.6 qualitative analysis software simply in order to systematically apply the final coding scheme. Further analytical review – by university researchers in collaboration with teacher, colleague and subject specialist – included a final teacher interview to further clarify issues emerging from the analysis or raised by specialists. The process culminated in the development of a simple but comprehensive narrative account, contextualised for each of the four subject areas. Each narrative was represented by a map with links to selected video sequences and slides (reproducing whiteboard displays) illustrating the main themes identified, plus the informative interview, diary and meeting excerpts (“nuggets”), and review grid commentary from all three groups. A fifth account examined similarities and contrasts of pedagogical approaches within and across cases, reviewing these in light of the negotiated theoretical framework.

Phase 5: Presentation of findings. The research findings were ultimately exploited through collaborative development (and professional authoring) of five presentation
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CD-ROMs characterising the key generic and situationally specific mediation strategies emerging from microanalysis across multiple data sources both within each case and across subject cases (drawing on the analytic tradition in the case study literature: Yin, 1998). The design and content of the multimedia resources are detailed immediately below. In this final production phase, the ultimate selections of lesson video clips and associated segments of analytic commentary were made, further alternative strategies were generated, and issues for viewer discussion and reflection were identified and incorporated in the resources.

T-MEDIA PROJECT: MULTIMEDIA TOOLS FOR PROFESSIONAL DEVELOPMENT

Aims

The five interactive resources have a user-controlled hypermedia format. They are intended for use by practitioners, student teachers, mentors, heads of department, teaching and learning coordinators, advisors, teacher educators and researchers. Their aims are to:

• highlight key issues emerging from our joint analyses and exemplify strategies and contextual conditions for success, including integration with non-digital resources and activities;
• use video clips and narrative to illustrate how projection technology can potentially be exploited to enhance collaborative construction of subject knowledge – in ordinary classrooms with learners across the attainment range;
• share a theoretical lens through which the rationale underlying this practice can be rendered more visible and meaningful to other practitioners;
• allow viewers to engage with the material at a deeper level and to build bridges with their own experience and practical theories of how they can promote learning using technology;
• stimulate teachers to question their own practices and assumptions and to debate with departmental colleagues about effective or innovative pedagogical approaches, “added value” and possible alternatives;
• develop user confidence to try out new approaches and provide examples of teaching resources.

These aims are consonant with our clear statement from the outset to participants and audiences of the research that our video-based materials are not intended to provide idealised or prescriptive models of “best practice”. Those are often considered “staged” by teachers:

• novice teachers may feel disempowered by portrayal of supposedly expert practice that may appear hard to emulate;
• in-service teachers are likely to dismiss the ideas and exemplars as irrelevant to their own school contexts or to be overtly critical, especially of the unrealistic conditions often portrayed (e.g. small classes of well-behaved children);
• teachers may, understandably, ‘cherry pick’ the materials perceived as most relevant and dismiss the rest; we know that effective teachers do not simply adopt curriculum materials (or their embedded reform messages) wholesale but they decide for themselves how to enact lessons.

Moreover, international comparative research using video (NRC, 2001) confirms our belief that it is unrealistic to assume we can identify “best” or even “effective” practice and the precise elements to be imitated (which necessitates establishing an empirical link with learning gains). The substantial NRC review concludes that “using international videotapes to present exemplary practice and train teachers to adopt it is a particularly problematic enterprise that deserves more careful scrutiny than it has received thus far” (p. 23). It suggests that other contextual factors, including pupil group attributes, should be taken into account. So instead we provided video exemplars of authentic situations for discussion. In selecting a sequence of clips for presentation, we went beyond the original selection of critical episodes in some cases, for example including a further clip portraying the teacher introducing an activity that was the subject of a later episode, or a clip showing how an activity was followed up or responded to by pupils. The context, including interactions both before and after a specific interaction, informs the viewer better about the sequence of and connections between activities over time. It gives the clips meaning for the researcher and the viewer (Haw & Hadfield, 2011).

We recognised that video vignettes cannot “speak for themselves;” video alone can lead to unfocused sampling and it is insufficient in supporting reflective dialogue. Lesh and Lehrer’s (2000) assertion that “video draws its power from the interpretive framework established by researchers” (p. 673) was borne out. In this case the framework was co-constructed with practitioners and then drawn upon in devising the built-in guiding activities. Suggested issues for user discussion reflect some external constraints and tensions arising – for example the balance between pupil and teacher manipulation at the board, and advance versus real time construction of resources with learners. Moreover, analytic commentary from different interpretive perspectives was included with each clip; apart from the option to consider these different perspectives on the same practice, the commentary offers the viewer further information about the teacher’s thinking and the context, if desired.

These multimedia tools can be used by groups of colleagues or educators debating approaches and issues with groups of practitioners (or pupils), or by individuals, reflecting on the materials, and optionally recording thoughts to share. The tools also offer guiding principles for designers of further video-based activities that move away from “best practice” models towards one of stimulation and inspiration.

Content and Uses

The resources were originally produced on CD-ROM and made freely available at cost price. They now appear online as well at http://t-media.educ.cam.ac.uk/. There
are four individual subject CD-ROMs / online resources and a fifth overarching one (“Across Subjects”: see Figure 1.2) that presents excerpts and themes emerging across cases. (A two-disk compilation pack contains all five resources.) The maps of emerging themes and narrative accounts contain hyperlinks to related video clips and analytic commentary, with each clip in turn linked with professional development activities. These were designed to permit the results of the detailed case analyses to be discussed within a broader framework.

Each resource includes (12–21) video clips, each 2–9 minutes long and with an introduction plus related commentary and materials (see screen shot in Figure 1.3):

- a summary of the whole lesson for contextualisation;
- scaleable images of the screens displayed in the clip;
- overview of IWB features and other resources used;
- teacher commentary on the episode (from teacher’s and colleague’s grids, relevant diary and interview material);
- university researcher commentary (from grids);
- further commentary from subject specialist/s, team discussions, pupil perspectives occasionally;
- suggested alternative teaching approaches, not necessarily using technology;
- issues for discussion;
- prompts for reflection intended to focus on individuals’ own practice; this facility enables text input for saving or sharing with others.

Each resource also includes:

- an interactive Disc Overview map (Figure 1.4);
- a Tour of the Disk demonstration video with voiceover;
- an audio introduction to the resource spoken by the teacher;
RESEARCH FOCUS AND METHODOLOGY

• background information about the teacher, pupil group, school, aims of each lesson sequence, research team and research methods;
• details of the perceived “added value” of the technologies used and qualitative evidence (teacher/pupil accounts) for learning in each lesson;
• downloadable lesson resources, pupil work, whole-lesson video summaries plus screen displays;
• a glossary of terms used;
• references to literature and other resources.

In designing the resource, we drew on our collective intuition – supported by research (Sheard & Harrison, 2005; Sorenson, Newton, & Harrison, 2006) – that presenting multiple hyperlinked resources and allowing flexible access according to users’ own motivations and interests, is most successful for professional development. Users can
therefore obtain a lesson sequence overview and information about participants or methodology before viewing videos either chronologically or navigating selectively via an interactive map of technology features (hyperlinked to exemplifying clips: Figure 1.5), or via a clickable map representing pedagogic themes and links (Figure 1.6). Options are also available via nested menus (Figure 1.7). The resource can thus be used to explore either issues around the use and choice of different hardware and software (e.g. interactive whiteboards versus data projector only), or more general pedagogical issues (e.g. the role of teacher questioning in encouraging pupils to build on each other’s ideas).

Resource design and content were heavily influenced by teacher suggestions that included the use of “pop-up” still images/slides accessible alongside clips, some clips showing no technology use, and occasional footage from the second camera integrated to reduce teacher focus. Several technical issues arose in representing
complementary interpretations of a single video record using hypermedia. Based on related theory, the issues we considered included simultaneous use and proximity of multiple representations, cognitive load, and degree of user control over navigation (Clark & Mayer, 2003; Zahn, Barquero, & Schwan, 2004). Also of concern were contextual factors that may limit generalisability (National Research Council, 2001), and the merits of the “guided noticing” paradigm developed by Pea, Mills, Rosen, Dauber, Effelsberg and Hoffert (2004) for expressing multiple perspectives on significant interactions. Professional, broadcast quality video recording proved important in this context of technology use for providing rich data that clearly capture the dynamic processes of annotation and interaction with projected images.

The lengthy narrative accounts weaving together the themes emerging from our analyses are located within five files accessible on the Across Subjects CD-ROM"online resource and also segmented within the Themes area of each resource. We recognise that the narratives encompass causally linked assertions about how the themes are interrelated (Juzwik, 2006). These proposed interrelationships, along with the hyperlinks to video clips of critical episodes illustrating each theme, inevitably introduce a viewpoint on observed events and strategies. Generation of themes and selection of episodes were negotiated by consensus (transcribed meeting notes are available to other researchers for inspection so that our conclusions are traceable to the data: ibid.). They were shaped by our research focus; other “takes” on the data undoubtedly exist and we recognise that viewers may bring new levels of meaning and different interests, as discussed further in the Conclusions chapter (11).

The materials have been distributed widely, for example via subject associations, teacher education networks, publications for the teaching profession and our publications website. A significant degree of interest has been expressed in the
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research outcomes by academics, practitioners, trainees and teacher educators, and the CD-ROMs have been requested by individuals and organisations all over the world.

Prototypes were piloted with academic and practitioner subject colleagues and commentary upon the resulting resources from different audiences continues to be welcomed. They have been trialled with student teachers and the final versions have been embedded in a Masters degree course in Science Education at Cambridge University, with the aim of supporting teachers in developing effective ways to exploit the IWB to enhance learning within their own classrooms. The multimedia resources have also been used in outreach workshops nationally with leading teachers, and to support other Masters courses. At the time of writing these include an MEd course at Edge Hill University and an online MA Teaching and Learning course for primary teachers (i-Learning Technologies module) at Hibernia College, Dublin, where the case studies are “used as a stimulus to engage teachers in reflective discussion during online tutorials” (tutor).

Although a formal evaluation has not been conducted in these higher education and outreach settings (owing to lack of funding), feedback has been very positive. For example a report from one workshop stated:

Teachers were very keen to start using the materials in their schools and for outreach. Teacher-educators quickly saw potential for trainees. Delegates [appreciated holding] a constructive, non-threatening discussion of an unknown teacher; they suggested using a clip at every department meeting for a year.

Presenting footage of lessons filmed in a real classroom with pupils at the lower end of the attainment range, and offering a wide choice of flexible or structured routes through the multimedia resource, have particularly been found to appeal to teachers and mentors of student teachers. The mathematics resource has been trialled more extensively, as reported in Chapter 9.

DIALOGUE AND IWBS PROJECT: DEVELOPING THE METHODOLOGY

Research Focus

The methodology developed in the T-MEDIA project was refined and extended in another project, “Dialogue and IWBS”, in conjunction with collaborators Paul Warwick and Neil Mercer. Our aim was to work together with the three participating teachers to analyse and develop theory and practice concerning classroom dialogue in the context of using the IWB.

Our substantive focus in this project was on pedagogic strategies for orchestrating dialogue in the context of IWB use (Mercer, Hennessy, & Warwick, 2010), recognising that the technology offers new opportunities for dialogue in which pupils physically contribute their own ideas and a class can construct new knowledge together (Hennessy, 2011). In order that readers can make sense of the study (elaborated in
Chapter 6), the substantive focus is elaborated briefly here before describing how the methodology of co-inquiry was developed.

**Dialogic interaction and interactive whiteboard technology** Dialogic interaction is an evolving pedagogical approach in which teachers and learners share ideas and reason collaboratively (Alexander, 2004; Mercer & Littleton, 2007; Mortimer & Scott, 2003). Teachers support such reasoning through open-ended higher-order questioning, reformulating, reflecting and interpreting. However, a dialogic approach is not common practice, in UK classrooms at least. A significant strength of the IWB technology lies in its potential to support the collective and visible expression and evaluation of learners’ ideas, and thus the co-construction of new knowledge during interactive whole-class teaching (Mercer, et al., 2010). It lends itself to supporting dialogic classroom interaction in which teachers and learners construct digitally represented knowledge artefacts together (Hennessy, 2011). These visible, dynamic and constantly evolving resources constitute interim records of activity and act as supportive devices for learners’ emerging thinking, rather than finished products of dialogue.

Our project built on our previous observations of how some reflective practitioners harness the **affordances** of IWB technology more than others (Gillen, Kleine Staarman, Littleton, Mercer, & Twiner, 2007; Hennessy, Deane, Ruthven, & Winterbottom, 2007; P Warwick & Kershner, 2008). The term affordances (Gibson, 1979) refers to perceived advantages, neatly described by Conole and Dyke (2004, p. 204) as “what uses ICT invites and facilitates, what it lends itself to and what it can do well”; thus moving beyond the intended, prescribed or designed function of technology towards creative and innovative responses to technologies and adaptation for use in unforeseen circumstances. IWB affordances include **provisionality** (objects on the whiteboard are easily modified so that ideas can be tried out before being finalised), **interactivity** (direct manipulation of objects), and **multimodality** (multiple communicative modes). Together they increase the opportunity for teachers to create space, time and status for learner contributions, and to challenge thinking by exploring different perspectives. The teacher’s role is critical in sustaining dialogue around these multimodal representations and in making explicit the importance of explanation and justification of ideas. Examining and developing this role was the substantive focus of our wider project, with its central question: **How can practitioners with an established dialogic approach to teaching exploit the IWB technology to support pupil learning?**

**The co-inquiry process underlying the dialogue and IWBS project** The goal of the research was to engage teacher participants in reflecting on, making explicit and developing their own dialogic practice. This was to involve (a) deliberating on the underlying issues and principles, (b) debating the merits and limitations of both conventional representations of dialogue and others’ documented classroom practices, and discussing their adaptability to participants’ unique contexts, and
(c) designing, implementing and critically evaluating creative pedagogical strategies that support teacher–pupil and pupil–pupil dialogue using the IWB.

The process of co-inquiry involved jointly assessing the utility of theory and practical guidelines derived from research in the area of dialogue and using relevant aspects of these to inform thinking and, as in T-MEDIA, to recontextualise and refine the theory itself. We set out to extend the T-MEDIA methodology in several significant ways. The primary goal this time was on developing as well as scrutinising and documenting classroom practice. A central feature was that before lesson filming, teachers and university researchers participated in workshops in which resources, especially video, were used to stimulate the reflective dialogue that formed the basis of our research partnership. The workshops served the dual purpose of professional development (for both the teachers and university researchers) and data collection, helping us to make explicit and capture our collective thinking as it developed. The theory-building process in this project benefited greatly from: critique of carefully selected stimuli; deep reflection within teacher diaries; iterative representation of our thinking about developing strategies already embedded in practice. It also included fruitful interchange between teachers of different subjects and primary/secondary phases of schooling. Our aims can be summarised as follows:

- to develop the evolving methodology for equitable research collaboration with teachers by incorporating some new stimuli;
- to undertake a workshop-based process of intermediate-theory building and video analysis aimed at co-constructing and documenting a research-informed perspective on dialogue and dialogic pedagogy in the context of IWB use;
- to solicit teacher perspectives on the theory building and on other aspects of the co-inquiry process and its outcomes for them;
- to reflect from a university researcher perspective on the dynamics, methods and scalability of the collaborative theory building process, and on how its outcomes might be shared more widely.

Intermediate Theory-Building Workshops and the Role of Video Records of Others’ Practices

An intermediate theory of dialogic teaching involving IWB for whole-class settings was developed through workshops that included sharing, questioning and recontextualising established notions of dialogue and dialogic pedagogy. Beginning in the first workshop, the team co-constructed a descriptive framework with the aim of reconciling some of the variation in use of these terms in the literature, and translating this into language that other teachers could access. This crucial modification to our previous methodology continued throughout the project as a dialogic cycle of exchange in which the scholarly knowledge being examined was not only synthesised and reformulated but also “activated within teaching” (Ruthven, 2002, p. 596).
The workshops were again conducted away from school sites, at the university. Gearing the workshop activities towards incorporating and testing new ideas in their classrooms and then discussing the experiences in subsequent workshop sessions combined the advantages of working in both settings. Because our three case study teachers were reasonably confident using a dialogic approach, they were able to engage with the literature and other stimuli and bring their own professional knowledge to bear.

Our procedure for introducing theory in the workshops combined:

(a) distribution of occasional short readings (detailed in Table 1.2), mainly for reference rather than as “assignments”;
(b) some short presentations synthesising key research in the field;
(c) informal introduction of theoretical constructs into our ongoing discussions (referring to printed resources where appropriate) at points where they seemed relevant. This was mainly during joint viewing of videos or when teachers interpreted an example of practice in a way that stimulated a link being made by a university researcher to familiar work.

The small number of teachers permitted plenty of opportunities to discuss specific resources, ideas and exemplars of practice, and enabled the team to establish our degree of alignment with the constructs encountered. This process supported the progressive development of theoretical awareness and the co-construction of our own account of dialogue (rooted in practice).

We did not want to overwhelm the teachers with theory, so were selective in what we included in discussion. So, for example, we did not mention the theoretical framework of Bakhtin (1981) and Wegerif (2007),11 but nevertheless brought some of their ideas (e.g. “orienting oneself to others’ perspectives”) into our presentations and discussions, and they are evident in the final account. Other ideas (e.g. “willingness to change one’s mind”) remained explicit throughout, and further initially explicit ideas (“consensus”, “dialogue” itself) became reformulated (“synthesis”, “nonverbal dialogue”) or had “faded” (Ruthven, 2002), as elaborated in Chapter 6. Thus, the salience of original theories within the intermediate framework varied, as in examples by Ruthven, Laborde, Leach and Tiberghien (2009), both at the point of exposure and in their use.

This grounding in educational theory and exploitation of some new stimuli in workshops before lesson observations were undertaken was a crucial feature of this study. We devised resources to use as springboards for discussion and subsequent lesson planning, and to try out a dialogic approach supported by technology use. (Specific resources used are listed later on in Table 1.2). The design built upon an NCETM (National Centre for Excellence in Teaching Mathematics)-commissioned T-MEDIA follow-up study employing the mathematics resource, as described in Chapter 9. In that study the resource acted as an external catalyst for discussion within a cycle of teacher-led collaborative professional development – through video-stimulated dialogue and critique, joint lesson planning with a common
teacher-selected focus, peer observation, feedback and joint reflection. The Dialogue and IWBs study used similar resources except that the teachers did not observe each other in person but had their own lessons videoed.

The main resource was a set of digital video exemplars of teachers integrating IWB technology into their practice. These were recordings both (1) from participants’ own lessons and (2) from those of other, unknown teachers in prior projects (in Phases 1b, 1c and 3 below). Use of (1) has proved effective in professional development work carried out independently by Jones et al. (2009) using “video-stimulated reflective dialogue” to improve pedagogy in using technology to support dialogic teaching in mathematics and science. Other research (reviewed by Borko, et al., 2008) shows that teachers observing their own teaching are able to activate contextualised knowledge about the classroom observed and their own teaching practices, and to identify areas for improvement. Viewing clips of their own footage with others in an ongoing “video club” helped mathematics teachers in one study to develop the skill of “noticing” (van Es & Sherin, 2008). Noticing is a key dimension of reflection and involves “(a) identifying what is important in a teaching situation; (b) using what one knows about the context to reason about a situation; and (c) making connections between specific events and broader principles of teaching and learning” (ibid., p. 245). Through this process teachers are found to develop important insights into their students’ thinking and to come to talk about classroom interactions in new ways. They use their interpretations to inform pedagogical decisions.

Note that (a) assumes that something identifiable and singular is significant; van Es and Sherin (2008) indicate that their facilitation methods influenced teachers coming to focus their comments on interpreting students’ mathematical thinking. This may be considered highly desirable but it must be acknowledged that teachers were guided in this way in their study; “What did you notice?” yields very different outcomes to “Did you notice X?” Some professional development programmes have instead defined criteria for choosing a video clip but have not otherwise constrained what was noticed (Coles, 2012; Jaworski, 1990).

Use of (2) relates to work using the Interactive Classroom Explorer interface with teachers who learn through critiquing digital video extracts of exemplary practice (Sorensen, et al., 2006). Both forms of video can engage teachers in fine-grained analyses of classroom practice (Sherin, 2007) and both can be useful for professional learning. In a comparative short-term study embedded in the extensive 6-year IPN Video Study in which 250 science lessons were recorded in German and Swiss classrooms, use of video from teachers’ own classrooms proved more motivating than watching videos of an unknown teacher (Seidel, Stürmer, Blomberg, Kobarg, & Schwindt, 2011). It was more stimulating of professional development in terms of both deeper immersion in the topic or lesson and resonance – “activating teaching experience,” i.e. participants had their own teaching in mind. However, teachers were less self-reflective and articulated fewer critical incidents and alternatives after watching their own lessons, implying that self-defence mechanisms operate.
Where teachers are (3) observing their known colleagues in action rather than their own footage, they learn new pedagogical strategies, better appreciate their students' capabilities, and realise that they all struggle with similar issues (Borko, et al., 2008). However, if the colleagues are present during the discussions, it is likely that participants will feel inhibited from articulating criticisms and prefer to focus on ideas and practices that stimulate their own thinking.

While Coles (2012) suggests that the choice of video (teacher-created or not, familiar or unfamiliar setting) is not as important as the use made of it, the three kinds of videos are considered here to serve complementary purposes.

- Use of (1) makes teaching and learning in one's own classroom more accessible as a lesson can be viewed from the perspective of an observer (Sherin, 2007). It supports critical noticing of selected, relevant and important events as long as teachers feel safe and risk taking is supported (Borko, et al., 2008). It also helps teachers focus on pupil understanding and participation (van Es & Sherin, 2008).
- Use of (2) allows teachers to experience and more freely critique a wider range of practices (as illustrated in Chapter 9), raising the possibility of comparing and contrasting alternate pedagogical strategies (Sherin, 2007).
- Use of (3) offers new insights that can be contextualised through face-to-face discussion with the videoed teacher, and practices can be immediately compared with one's own. It is also interesting to compare events and issues highlighted by the subject of the video and by the colleagues watching.

All kinds of videos were used as stimuli for debate in a series of in-depth workshop (team) discussions – although videos of type (3) involved colleagues from other schools of course, not from the same school community, as was the situation in T-MEDIA. In each case, short clips were selected; teachers consider these to be more useful than a whole lesson (Coles, 2012). The discussions focused on the key construct of “dialogic interaction” that had emerged as centrally important in our previous collaborative data analyses and in the literature, and on extending it to new contexts.

Research Partnership through Dialogic Inquiry

We sought to achieve a truly equitable approach to co-constructing new practices, whereby (as before) the insights and reflections of all were equally important in formulating and refining theory. Our workshop procedures built on a growing body of research on successful approaches to professional development for classroom technology use: primarily those based on modelling, observing, reflecting, mentoring and peer discussion (e.g. de Freitas, et al., 2008; Miller & Glover, 2007). As mentioned in the Section One Introduction, this work illustrates teachers’ adeptness at adapting given models to suit their own contexts. Our approach drew additionally on prominent work that creates partnerships between university researchers and teachers engaged in transforming professional knowledge together, including the
CHAPTER 1

InterActive Education Project (Sutherland, et al., 2004; Sutherland, Robertson, & John, 2008; Triggs & John, 2004) and its follow-up (Armstrong & Curran, 2006). InterActive instigated “subject-design initiatives” (SDIs) – sequences of work focused on embedding technology into a small curriculum area to support learning. These were collaboratively designed by teacher–researcher pairs, informed by research evidence and theory, then implemented and evaluated in the classroom. Our study extended this approach in the various ways described above. The outcomes of the InterActive SDIs were found to vary according to the strength of the individual teachers’ pedagogy; our highly targeted sampling strategy was devised to maximise this strength.

We brought together teachers of very different subjects and across phases of schooling into a single team (another departure from both InterActive and T-MEDIA methodologies). This strategy was probably successful because it varied both subjects and phases whereas Jaworski (2007) found that some primary (mathematics) teachers felt uncomfortable working in a group with secondary colleagues with more experience of teaching the same subject. One might imagine that differences between the concerns of such a varied group of teachers would be too great, but we have previously observed that there are both common and distinguishing features of the pedagogic strategies that teachers draw on when using technology in different curriculum areas (e.g. Ruthven, Hennessy, & Brindley, 2004) and in different schooling phases. Our focus on dialogic teaching, an approach that we firmly believe to be generically applicable, prompted us to seek (and find) some commonalities across subject areas. The situated perspective indicates that the dialogic approach will of course manifest itself in different ways according to context (Putnam & Borko, 2000); the three teachers benefited here from vicarious encounters with each other’s different classroom settings and comparisons between them, affording reflection and critical analysis that would not have been possible when acting in the setting (ibid.).

The teachers shared a common pedagogical approach in which they held a personal investment, and had individual autonomy to plan new lessons based on that approach as it evolved through our co-inquiry. We recognised them overtly as experts in their subject domains and therefore as best equipped to assess what might work in their own classrooms. The university researchers were not experts “directing teacher learning” or offering simplistic recipes for success, but were merely familiar with literature that might be relevant to our co-inquirers’ classroom practices.

Similarly, we did not model dialogic teaching; we exposed all workshop participants to video exemplars of classroom practice, and decided together how dialogic the depictions were (or were not), and why. A notable departure from prior work in this field, then, is that we did not present “research-based proposals” for practice (McIntyre, 2005) other than the general remit of developing some form of dialogic approach. Teachers generated and tested proposals themselves from critique of the theory, exemplars of classroom teaching, and, importantly, from their personal perspectives of fit with (or adaptation to) their existing concerns, contexts
and practices. Analysing video footage from their own classrooms and sharing it with the team were vital to this process.

The iterative process of co-constructing a notion of dialogic pedagogy was in itself dialogic. It involved teachers and university researchers in cumulatively building on each other’s ideas and experiences as we reconciled theoretical concepts and ideas with evolving classroom practice and collective thinking and purposefully developed them further. A critical characteristic of our co-inquiry approach, then, was dialogic inquiry (G. Wells, 1999), in that dialogue is perceived as the central means through which knowledge building takes place in an authentic inquiry environment. The latter environment supports question posing, conjecture and innovative risk taking (Bransford & Schwartz, 1999), going well beyond mere exchange of ideas. Thus we construe dialogue and inquiry as co-determined. (The relationship between dialogue and inquiry is further explored to some extent in the theoretical synthesis by Hennessy, 2011).

DIALOGUE AND IWBS PROJECT: METHOD

Participants and Roles

Three UK teachers working in natural settings across various school phase, subject, and pupil-group contexts took part in the case studies. All three were experienced, reflective and articulate practitioners who were each known to one of the university researchers, and teaching at Faculty partnership (initial teacher education rather than research partnership) schools. I had not collaborated with my two colleagues previously, so this was essentially a new research partnership between the six of us, and we evolved a new way of working for this project.

The teachers were selected on the basis of having an observable, dialogic pedagogical approach, using an IWB confidently (though not necessarily expertly) as an integral part of their everyday practice, and as before, being willing to take a critical research stance (Stenhouse, 1975, p. 156). An orientation towards research participation has also been linked with “willingness to engage in a meaningful way with [prior] research” (Simons, Kushner, Jones, & James, 2003), another important selection criterion this time. The three were:

Diane (Deputy Head Teacher and Curriculum Leader with 10 years’ teaching experience) worked with primary children aged 10. She chose to focus on personal, social, health and citizenship education (specifically, the topic of personal safety and assertiveness) for the study. Diane is a senior mentor who teaches on the Faculty’s mentoring course, where she explains how a dialogic pedagogy informs her work in developing reflective practice with student teachers. As an exemplar teacher for postgraduate observation visits, she has been seen teaching by many of our Faculty colleagues, who recommended her when we sought dialogic teachers for the project.

Caroline (Head of English with 5 years’ experience) worked with middle-school pupils aged 12–13, and introduced crime-story writing in her lessons. Caroline
undertook her postgraduate teacher training and the “Fast Track” leadership programme at Cambridge, and was therefore subject to additional scrutiny with respect to classroom pedagogy. She has often talked in the Faculty about her pedagogical approach with student teachers and is seen by her school’s senior managers as having exemplary classroom practice. Since this study she followed up the work by enrolling in our MEd programme (2008–10) and used her dialogic teaching as a springboard for evaluation and development of teaching in her school.

Lloyd (Head of Humanities with 18 years’ teaching experience) worked with secondary pupils aged 13–14, and focused on trench warfare during World War I in his history lessons. Lloyd had participated in a previous research project (Technology-Integrated Pedagogic Strategies, 2000–02) and as already described, in T-MEDIA, where his dialogic approach was directly observed and scrutinised in depth during our thematic analysis.

The three teachers all worked in mixed-sex schools within a 25-mile radius of Cambridge. Our interactions over time with the schools indicated that they all had a research culture and leadership supportive of our co-inquiry, an important precondition for its success (Baumfield & Butterworth, 2007). The primary school class was a heterogenous grouping (mixed attainment levels) comprising the younger half of the year cohort. The school was in an ethnically diverse inner-city location and had levels of socioeconomic disadvantage (as indicated by entitlement to free school meals) significantly greater than the national average. The suburban middle school had a level of disadvantage lower than the national average, and the class contained the upper half of a year-group cohort grouped primarily in terms of attainment on a standardised writing test. The secondary school was in the same location as the primary school and had average levels of disadvantage, and specialist Technology College status. The class was an (experimental) all-boys grouping within history, designated as homogenous (highest attaining of four classes). This class was deemed valuable for case study because it contained two pupils in the “Pupils as Learning Partners” scheme. This involved the pupils (incognito to peers) commenting on lessons using a diary and a lesson observation sheet that Lloyd had devised to categorise classroom interaction, focusing on dialogue. They discussed their responses with the teacher and even helped with subsequent lesson planning. The scheme was a remarkable outcome of Lloyd’s earlier discussions with colleagues about the T-MEDIA research, and its development had subsequently received external funding.

To compare across the schools, the secondary and middle school classes had no pupils with severe special educational needs, whereas a very high proportion – half – of the primary class (13/25) had Individual Educational Plans. This meant that they had special educational needs of some kind. They constituted the most challenging group that Diane had ever taught. “Value-added” standardised test data showed that pupils in all of the schools made good progress relative to their intake performance levels.

We supported (and funded) the teachers in achieving accredited recognition from our Faculty via the Certificate of Educational Enquiry programme. This required
them to write a 4,000-word report that included reflection on inquiry processes and findings. Encouraging them to carve out and investigate an aspect of the research that they found of particular interest recognised teachers’ prioritisation of practicality in applying ideas from research (McIntyre, 2005) and increased the degree of personal ownership.

In addition to the three teachers, other participants in the research collaboration were: the pupils filmed (the two Learning Partners also participated in a video analysis session), three university researchers (the authors) and an expert IWB user, Chris (T-MEDIA science teacher), who provided some workshop input. A research assistant recorded and processed the audio and video recordings.

Data Collection

The programme comprised a phased, workshop-based process, in which we progressively deconstructed existing ideas about dialogue and exemplars of existing practice. All workshops were attended by all three teachers plus at least two university researchers.

Phase 1: Initial workshops. The programme began with three full-day workshops, all scheduled within a two-week period. The workshop activities and use of stimuli are summarised in Table 1.2.

Phase 2: Classroom lessons. Three consecutive lessons were videoed in each classroom; one researcher and our research assistant were present at each. Piloting during two familiarisation lessons before each study began assisted resolution of technical issues. The teachers kept unstructured diaries recording their pre- and post-lesson reflections, observations and strategic planning. They were interviewed once about their plans (using a semi-structured schedule) and twice again after lessons (using printed prompt cards) for about an hour. IWB resource files and captured annotations, lesson plans, worksheets, digital photographs and copies of pupil work provided valuable additional contextualising data. Copies of all data were circulated to the researchers and the teacher they concerned, including copies of the videos on CD.

Phase 3: Video review. Two months after the end of Phase 1, the whole team reconvened for a fourth half-day workshop to review our experiences and evolving construction of dialogue. Teacher-selected video clips (and transcripts) were shared and used in generating criteria for identifying critical episodes. This technique had been used by Sheard and Harrison (2005) and Armstrong and Curran (2006) because it offered greater teacher ownership over the data than is customary. As in Phase 1 with pilot videos, then, teachers reviewed their own and each other’s lesson videos together. Our negotiation of the definition is elaborated in Chapter 6. Ultimately we defined critical episodes of IWB-supported dialogue as
### Table 1.2. Dialogue and IWBs project Phase 1: Activity in Day Workshops 1–3

<table>
<thead>
<tr>
<th>Phase</th>
<th>Activities</th>
<th>Purposes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Pilot filming of 2 lessons with each target class.</td>
<td>Community building (Jaworski, 2007); familiarisation of whole team with all teachers’ existing classroom practices and pupils; construction of shared understanding of their approaches to supporting dialogue and discussion of what seemed effective.</td>
</tr>
<tr>
<td>1b</td>
<td>Workshops begin, employing range of resources as stimuli for reflection upon practice: commenting &amp; reflecting on teacher-selected extracts from pilot video footage. Participants commented on their own and colleagues’ practices.</td>
<td>Formulation of thinking about issues such as pupils’ use of the IWB versus spectatorship, use of nondigital mini-whiteboards to engage all pupils, added value of the IWB and status as a tool, role of talk in a multimodal context, importance of creating a supportive environment for dialogue, need for explicitly developing reasoning skills.</td>
</tr>
<tr>
<td>1c</td>
<td>Researcher presentations: managing dialogic teaching and learning (Warwick); strategies for engaging pupils in using the IWB (Hennessy); “exploratory talk” and “talk rules” (Mercer); illustrations from professional development activities generated by ‘Thinking Together’ research on development of classroom language and reasoning (Dawes, Mercer, &amp; Wegerif, 2004; Mercer &amp; Littleton, 2007).</td>
<td>Evaluation of illustrated approaches (of unknown teachers) and applicability to teachers’ own contexts; discussion of ways of further exploiting IWB technology to enhance their own approaches.</td>
</tr>
</tbody>
</table>

*Viewing video clips and transcripts from our previous research, including 3 T-MEDIA CD-ROMs; footage from ‘Dialogic Teaching in Science Classrooms’ (Mercer & Scott, 2007) and ‘IWBs as Pedagogic Tools in Primary Schools’ (Gillen, et al., 2007)*

*Distribution of literature: short article on questioning strategies (Cardellichio & Field, 1997); Futurelab report on IWBs (Rudd, 2007), Alexander’s (2004) treatise on dialogic teaching; Mortimer and Scott (2003) chapter; Lloyd’s own lesson observation coding scheme based on the latter framework (see Hennessy & Deaney, 2009a).*
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1d Exploration and iterative refinement of notions of dialogue and pedagogical strategies for using IWB to facilitate it, developed during each workshop and then through interaction with data (ongoing negotiation of phrasing).

Capture of our collective ideas as they were generated, refined and integrated, within two constantly evolving tables in brainstorm format (see Tables 6.1–6.3 in Chapter 6, and Appendix 7).

Unstructured diaries kept of teacher reflections on each workshop experience. Audio-recording, partial transcription or summarising of workshop discussions.

Documentation of evolving shared interpretations of both dialogue and process of our collaboration.

Technical input from an IWB-experienced expert (science) teacher (Chris) – extensive dialogically-oriented demonstration of using sophisticated IWB features in the classroom; subsequent availability for one-to-one technical assistance. (To tailor the input, participants’ existing and desired IWB skills and access to equipment were surveyed beforehand.)

Development of teachers’ technical expertise and increased range of features available for exploitation; continuing support during subsequent lesson planning where desired.

Design of mini-modules of IWB-supported work (during and after Workshop 3) that encompassed the dialogic principles embodied in our tables, fit within the curriculum and teachers’ current teaching schemes, and were adaptable to other contexts.

Activation of evolving dialogic theory within teaching practice; exploration of flexible, learner-responsive approaches.

Note. Activities are not all sequential as some phases overlap, for example 1d was ongoing throughout the project.
• collectively illustrating a range of IWB uses;  
• including dialogue that is: stimulated by well-selected resources that are engaging and/or meaningful to learners; linked with any level of IWB use but including some pupil ownership of the board; arising from opportunities for focused, cumulative, open-ended discussion in whole class, pairs, or groups; moving forward pupils’ learning.

Importantly, after initially reviewing the videos we revised our notion of critical episode to include both discrete episodes of IWB use (as planned) and larger cycles of activity sustained or phased over time. We agreed that critical episodes only make sense in light of the “bigger picture” and that “some lessons may be a continuous story characterised by dialogic interaction”.

Subsequent analysis and discussion of episodes (9–10 episodes per subject) was carried out by one university researcher (normally the one present during filming) in collaboration with the teacher (whose “insider memory of the lesson” was of major importance: Groundwater-Smith & Dadds, 2004, p. 255). Each member of the pair independently reviewed, critically reflected and commented on the three lesson videos along with diaries, interview transcripts and other data. They recorded and exchanged their thoughts and selections with precise timings, then met for 3–5 hours to compare them. Lesson videos were available on a laptop computer throughout the meetings, and transcripts of provisionally identified critical episodes were prepared beforehand. Initial impressions about episodes were (mainly) verified or aligned and elaborated through subsequent joint scrutiny, or (rarely) abandoned through consensus.

Analytic commentary took the form of a set of review notes for each case. These were created by the university researcher, who first documented the teacher’s prior pedagogical aims for promoting dialogue using the IWB (data from the planning stage Interview 1), then briefly summarised each selected episode. Both reviewers independently described the part played by the technology and the teacher in each chosen episode, the underlying rationale and effectiveness of the pedagogical approach in terms of quality of dialogue, and the level of learner participation (cognitive or physical). These procedures were loosely based on sociocultural discourse analysis, an approach developed by Mercer (2004) and colleagues to understand participants’ own meanings within small segments of conversation through identifying key phrases signifying reasoning. This methodology was adapted to our context of technology use, where the archiving and revisiting features of the IWB technology serve to support cumulative knowledge building across – as well as within – critical episodes and lessons. Our analysis therefore examined connections made during extended sequences and cycles of dialogic interaction. We identified some short clips providing essential contextual information for critical episodes (e.g. a task introduction) and investigated links between dialogic activities away from the board and activities involving it, in the present, past, or future. Transcripts and video recordings were reviewed in conjunction with interim screen shots of digital artifacts on the IWB; this helped us understand how artifacts are actively created and
dynamically manipulated in conjunction with talk and written texts, extending the notion of dialogue to multimodal interaction.

The university researcher’s comments were interspersed with direct quotes about the episode or lesson from the post-lesson Interviews 2 and 3. They included questions for discussion with the teacher, intended to clarify the rationale for a particular action or interaction or views about the unique contribution of the technology. For instance, “Why were pupils not initially informed that they would need to reconcile their ideas by working with a partner after planning their storyboards individually?” The document was refined after the review meeting to incorporate both reviewers’ written reflections and the outcome of their verbal negotiations, drawing on a transcript of the meeting.

This review process enabled us to identify what the data in each case revealed about the integration of IWB use to support dialogue. The newly developed pedagogical approaches were thereby scrutinised, debated and subsequently refined by the teachers. This phase culminated in a final agreed set of critical episodes from each classroom, a rationale for their selection, and some initial messages for our understanding of dialogic pedagogy in the context of IWB use.

Phase 4: Final workshop. Five months after Phase 3, the whole team reconvened during a fifth half-day workshop (not originally planned). This session allowed us to consolidate our thoughts about dialogue and the role of the IWB across the three classrooms, and to provide feedback to the teachers on their findings and reflections on their own data before writing the certification reports. We discussed the expected impact within the three schools and the practical and attitudinal obstacles to adoption of a dialogic approach and IWB use by novices. We revised our drafts of the dialogue tables initiated in Phase 1 to serve as resources that might spark inquiry by other teachers (see Table 6.3 and Appendix 7). We also sent teachers a short follow-up, open-ended questionnaire to solicit individual feedback on the process of collaboration and its impact on their thinking or practice.

Phase 5: Cross-case analysis. Finally, the university research team conducted a cross-case analysis, comparing and contrasting approaches used in the three different settings. We aimed to make conditions for dialogue in an IWB context explicit so that they might resonate with other teachers’ experiences. This was achieved through revisiting videos of critical episodes plus systematic thematic coding of all (27) teacher diaries, (5) workshop transcripts, (3) review meeting transcripts, (9) interviews, (3) follow-up questionnaires and (3) certification reports using HyperResearch™ 2.6. In addition to identifying strategies for using the IWB and teacher/pupil responses (one coding category), this cross-case analysis served to solicit teachers’ perspectives on the collaborative research and analysis process itself. Our analysis resulted in six further, broad (non-exclusive) categories linked to the four methodological aims:

- articulation or development of teacher/team thinking and subsequent classroom practice;


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- development of tables characterising dialogue and dialogic pedagogy (see Chapter 6) / process of collaboration;
- development or dissemination of new ideas or practices within school or department;
- impact of workshop input (videos, dialogue literature etc.);
- pupil perspectives and responses to orchestration of dialogue (and impact on teacher practice);
- development of criteria for critical episodes.

As elaborated in Chapter 6, the process yielded a series of illustrative episodes in each case plus negotiated, recontextualised understandings of dialogue and strategies for fostering dialogic pedagogy. These were adapted for wider use, thus forming a springboard for further critique and modification in new settings.

DIALOGUE AND IWBS PROJECT: A PROFESSIONAL DEVELOPMENT RESOURCE

A professional development resource was commissioned by Open University Press and co-authored by the participating practitioners and university researchers (Hennessy, et al., 2013). Note that the decision to go with a commercial publisher this time reflected the volume of text to be presented and the desire to make a professionally printed product widely available at reasonable cost. All of the digital video clips remain openly accessible via the university’s streaming media service and the main resource bank and some of the materials produced are freely available online via a dedicated website at http://tinyurl.com/OUPIWB.

The materials are useable at primary or secondary levels, and across subject areas. They encourage teachers to create a supportive ethos for dialogue and engage students in a variety of forms of dialogic interaction and activity, both away from and at the IWB. The approach for providing stimuli for discussion, reflection and trialling of new ideas, the target audiences and suggested modes of use are all very similar to those for the T-MEDIA multimedia resources. The resource includes (see Appendix 10 for more detail):

- texts introducing the notions of dialogue and dialogic teaching and considering the role of the IWB;
- ‘dialogue tables’ – concisely summarising what happens in a dialogic classroom, what dialogic activity could lead to, and teacher strategies for supporting dialogue;
- a large Resource Bank of video clips (stored at http://sms.cam.ac.uk/collection/1085164) and screenshots illustrating whole class dialogue and dialogue in small groups in action plus brief descriptions of the classroom activities;
- an action plan document for a whole school approach to setting up and reviewing practice via staff meetings; this resource for senior managers of schools can be adapted for use by smaller groups or with other schools;
- sample and template IWB activities;
- six Reader chapters containing concise background readings, that report in an accessible way on the research underpinning this resource and offering some more
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in-depth illustrations from authentic classroom practice, along with reflections upon them (three chapters are case stories authored by the three participating teachers);
• ‘snippets’, or excerpts, from the research literature and from the Reader chapters;
• references for further reading.

CHAPTER SUMMARY

This chapter has described the process by which we developed grounded ‘intermediate theory’ through an intensive and equitable collaboration with practitioners during two main research projects. The first project (T-MEDIA) involved in-depth case studies of secondary classroom teaching and learning in English, mathematics, science and history with projection technologies including the IWB. Digital video records and other data were collaboratively analysed by the university research team and two teachers in each case. The resulting intermediate theory derived from recontextualising and refining constructs from sociocultural theory by applying them to specific classroom practices involving technology, and reframing them using accessible language. It was embodied within detailed narrative accounts linked to video clips of classroom practice. The outcomes were presented as five multimedia tools for professional development (one per subject, one overarching).

This methodology then evolved further during the Dialogue and IWBs project, in which a team of researchers and practitioners worked to develop as well as to analyse and document practice – in this case new uses of the interactive whiteboard to develop dialogic classroom interaction in English, history and personal, social, health and citizenship education. Joint review of literature and digital video exemplars, teachers’ own lesson videos and post-lesson interviews subsequently served to identify effective pedagogical strategies for supporting dialogue in this new context. The process of continually integrating researcher and practitioner perspectives along with insights from the data ultimately culminated in co-construction of an enriched understanding of “dialogue” and “dialogic pedagogy”, again framed in accessible language. A commercially published professional development resource was also produced by the team.

NOTES

1 Two of the teachers were Heads of Department, one was a Head of Year, the fourth was Assistant Principal, Advanced Skills Teacher and lead science teacher for Cambridgeshire, specialising in IWBs. Two had participated in the TIPS (Technology-Integrated Pedagogic Strategies) project (2000–02) with us, and two in the SET-IT (Situated Expertise in Technology-integrated Teaching: Mathematics and Science) project (2002–04).
2 Advanced Skills status is awarded to recognise expert UK teachers and partly release them from teaching in order to share their practice with others.
3 The Specialist Schools Programme (http://www.standards.dfes.gov.uk/specialistschools/) helps schools, in partnership with private sector sponsors and supported by additional Government funding, to establish distinctive identities through their chosen subject specialisms.
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4 Not all lessons were consecutive; in a couple of cases, interim lessons were observed but not videoed. Note that ethical issues raised by Powell et al. (2003) pertaining to video in classrooms were addressed. In particular, informed consent was obtained from students and parents or carers.

http://www.bera.ac.uk/publications/guidelines/

5 Video recordings (camera 1) were provided in compressed, easily viewable .mpeg1 format; footage from the second camera was incorporated in the final CDs where appropriate. Note that induction of the cameraman and piloting of the filming procedure were necessary for smooth operation and a high quality outcome. Briefing covered (a) the broad focus of research, (b) the specific focus of filming and criteria for removing the main camera from its tripod in order to follow the action, (c) set-up procedures and timetable/physical constraints operating, (d) criteria for intervention and (e) the need for a neutral personal demeanor. Piloting during a familiarisation lesson before each study began assisted determination of camera location and resolution of technical issues such as IWB glare and poor contrast.

7 These guidelines were deliberately framed to provide sufficient information for reviewers to act upon, but to be open-ended enough to reveal the features of interest to each individual without overly constraining the process. (They were less prescriptive than those employed in studies such as Moyles, J., Hargreaves, L., Merry, R., Paterson, F., & Esarte-Sarries, V. (2003). Interactive Teaching in the Primary School: Digging Deeper into Meanings. Maidenhead: Open University Press.: see their Appendix E for the 40 reflective questions posed). Commentary was applied only to viewer-selected salient portions of video – but coverage proved extensive in all cases.

9 Our previous work on technology use related to subject culture indicates that while practitioner knowledge and thinking is largely contextually bound, tied to specific pedagogies, activities, student groups and subject cultures, more generic patterns can be identified.

Filenames contain “Themes_Emerging.pdf” and are stored in the Downloadable Resources folders.


12 There was a single (mobile) video camera on a tripod, usually positioned facing away from the windows at the side of the classroom to minimise intrusion and to avoid backlighting. (One teacher commented that this camera angle made it easier to see and evaluate the activity from a pupil’s perspective, as he was keen to do, when reviewing the videos, whereas placing the camera right at the back as we had done in T-MEDIA yielded “a slight feeling of detachment”.) The teacher wore a radio microphone and a second radio microphone was positioned near students on the other side of the classroom.

This chapter was based on two co-authored articles, posted by permission of the publisher:


CHAPTER 2

CASE STUDY ONE: SUPPORTING KNOWLEDGE CO-CONSTRUCTION IN HISTORY

Rosemary Deaney, Arthur Chapman and Sara Hennessy with Lloyd Brown

INTRODUCTION

In this chapter we describe how the T-MEDIA research process enabled us to explore how the participating history teacher used the interactive whiteboard (IWB) along with other resources to mediate learning in his classroom – and how development of the team’s shared understandings contributed to the formulation of intermediate theory (as outlined in Chapter 1). Beginning with brief introductions to the team members involved in this case study (co-authors on this chapter), we review some key aspects of teaching and learning history as a curricular subject, and present an outline of the lesson sequence which provided our focal data. Tracing key threads through the process of video review, we present the three themes that we identified together, and draw on examples from our discussions to illustrate how the theoretical framework developed.

Further details about the participants and the lessons observed in this case study, plus video clips and other material illustrating the themes emerging and uses of technology, are available in the history multimedia resource freely accessible at http://t-media.educ.cam.ac.uk/.

PARTICIPANTS

Lloyd, History Teacher

Joining the project as a history teacher of some 25 years standing, Lloyd Brown had seen the widespread introduction of computers in schools over the past two decades. At the same time he had become increasingly aware of the potential of new technologies to enhance teaching and learning of his subject. In 2001, at Chesterton Community College, both he and his departmental colleague Rolf Purvis took part in a schools–university research partnership project with Cambridge University,¹ which focused on developing pedagogical strategies incorporating use of Information and Communications Technology (ICT). They worked together to explore the notion of “multisource” learning, in which a range of online resources was brought into play to enhance teaching and learning of particular topics. After the project ended Lloyd continued to build up an archive of online links and used a digital projector to share
CHAPTER 2

these materials with his pupils. Since then the school had purchased an IWB for the whole department, but as it was located away from Lloyd’s regular classroom, access had to be negotiated on an ad hoc basis. By the time he joined the T-MEDIA project, Lloyd finally had an IWB installed in his own classroom and had been using it for around 6 months. He saw involvement with the project as an opportunity to develop his approach to teaching a topic which, at that point, occupied a substantial part of the department’s scheme of work on the Tudors: the “Golden age” of Queen Elizabeth.

At the time of the T-MEDIA filming, Lloyd was Head of the Humanities Department. Subsequently he took on a more managerial role as Assistant Head. While his primary subject was history, which he had taught across his teaching career, he had also taught other humanities subjects such as geography and religious education, and, in more vocational areas, leisure and tourism and business studies. In the current post, he mentored trainee teachers on postgraduate programmes and led in-service development work in the school. He had developed an active interest in research and had held three UK government-funded Best Practice Research Scholarships, variously supporting investigations of: “multisource learning” (as mentioned above), development of oracy, and intra- and interpersonal multiple intelligences.

Rolf, Teacher Colleague

Rolf Purvis had taught at Chesterton Community College for more than 20 years, specialising in history and personal and social education. He was also Deputy Head. For several years he had coordinated research activities within the school. His particular responsibilities were curriculum, pastoral matters and research; in addition he was involved in the training and mentoring of newly qualified teachers, teacher researchers and school faculty leaders. He had also held two Best Practice Research Scholarships, focusing on “researching researchers” and, with Lloyd, “multisource learning”.

Arthur, History Subject Specialist

Arthur Chapman was an external academic colleague invited to join the team as subject specialist in history. He was well known in his field and also an experienced teacher and postgraduate teacher–educator. He contributed written commentary on the footage, which was added to the combined grids (as described in methods Chapter 1) and circulated prior to our meetings. Although Lloyd and Rolf did not meet him personally until later in the project, they valued highly his involvement from the outset, and appreciated the professional insights he conveyed. After the study, Lloyd reflected:

It was very, very interesting to have [Arthur’s] input and again I felt, even though I’d not met him before, that he was a very supportive colleague of things that he saw. And I think that was very important.
SUPPORTING KNOWLEDGE CO-CONSTRUCTION IN HISTORY

The mutual level of regard among the team was helpful in quickly establishing a forum of trust in which comments could be made and received as being exploratory and constructive rather than personally critical. Arthur’s written observations often provided stimuli for discussion during our review meetings. Some of the terms he used quickly became incorporated into our descriptive framework: for example the notion of *avoiding alienation* (of individual learners) by pitching tasks at an appropriate level of challenge.

**Pupil Group**

The class who worked with us in the project comprised 28 pupils aged 12–13, of both sexes. Attainment within this mixed group was spread across a wide range: for example, three children were described as “very able” while four received help for specific educational difficulties. The group also included some children from very challenging home circumstances. Lloyd considered the class as “mutually supportive” of each other and took this into consideration in designing activities to engage and challenge across the range.

**SETTING**

The school was a mixed, inner-city comprehensive of around 1,000 pupils, and served a socially and ethnically diverse community. Achievement standards were generally above the national average and the levels of educational disadvantage a little lower than national average. Over 90 languages were spoken by pupils in the school and over 25% came from homes where English is not the first language. It had specialist status as a Technology College and was also a Training School, whose role was to support the professional developing student, novice and established teachers within its local networks and through its links with the university. There was a strong research ethos in the school, supported by a flourishing research partnership with the university and connections across other networks in the area. Housed in buildings that had been extended and refurbished over its 75-year history, the site was also widely used for community activities. The lessons being described here took place in a classroom typical of others in the school – and indeed of many other UK classrooms built in a similar era, in which 30 or so desks were tightly packed and arranged in rows facing the front, where the teacher’s desk, IWB and projector were placed.

At the time of filming, the history department had only the one IWB and projector for use with teachers’ laptops, and no dedicated computer suite. When required, the department used a set of computers in the library for teaching. There was no formal whole-school ICT policy apart from one that covered internet use, but a 4-year programme had been initiated to increase the skill levels and sophistication of staff in using the technology.
LESSON TOPICS AND OBJECTIVES FOR TEACHING AND LEARNING

During the weeks immediately prior to filming, pupils had been studying a unit entitled “Could your religion get you into trouble during Tudor times?” Topics covered in earlier lessons had included an introduction to the Tudor dynasty and a comparison of Henry VII and Henry VIII. After this, the class had looked at changes in the church under Henry VIII, followed by the reigns of Edward and Mary, and leading up to the problems faced by Elizabeth I. Lloyd wanted to “get the kids to see that by the time we come to Elizabeth’s reign, some kind of consensus in religion is probably the best way forward for the country”.

The series of six filmed lessons spanned a 3-week period and was designed to address the question “How ‘golden’ was the age of Elizabeth I?” Much of the module had been written collaboratively with other members of staff within the department, and Lloyd aimed to incorporate a range of activities that would help pupils to characterise aspects of the Elizabethan age by exploring some of the problems Elizabeth faced and how she and her government dealt with them. An outline of the lessons is given in Table 2.1.

In the following sections we characterise Lloyd’s approach through outlining the pedagogical themes arising in this case study. Note that in this chapter and subsequent ones, themes defined on our coding scheme are in italic font.

LLOYD’S APPROACH

Lloyd’s own aspirations regarding history teaching and learning were grounded in a deeply held belief about the wider importance of encouraging children to express their ideas and to engage critically with those of others:

Teaching kids to think and be able to articulate and debate their views has always been sacrosanct to me. History provides a vehicle for this, but these skills are generic across many – if not all – disciplines. If people can engage with each other, that is a good thing. Is there a more important skill to survive in life than the ability to work with others?! (Interview)

Moreover, he took a highly collaborative approach to teaching his subject, and also regarded this democratising aim as a motivator for pupils’ engagement with learning:

Fundamentally, trying to get pupils to contribute as much as possible to collaborating with me on developing knowledge and understanding – the collaborative learning community, if you like. I also have a belief that kids can contribute ideas that make that knowledge and understanding richer and think it is important to help them understand that they can do that!

In this way, Lloyd saw the interactive possibilities afforded by IWB technology as serving to enhance the pedagogy that he already espoused. Alongside an introduction to the historical events to be studied in this lesson sequence, he planned to encourage development of pupils’ analytical and interpretative thinking through his strategic
### Table 2.1. History lesson sequence: Aims and content

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Aims</th>
<th>Lesson content</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lesson 1</strong>&lt;br&gt;Aims</td>
<td>– To establish idea of possible meaning of a ‘golden age’&lt;br&gt;– To use portraits to show change&lt;br&gt;– To consider the value of paintings as historical evidence</td>
<td>Recap on Tudor succession; Machyn’s diary entries re accession and death of Mary I on IWB. Pairwork with paper copies to identify difficult terms; Ps highlight text on IWB. T reads with class, interprets and discusses highlighted words. Ps list ‘possible problems Elizabeth faced on coming to the throne’ in exercise books then feed into whole class discussion. T displays [well-known] Armada portrait on IWB: How does the picture suggest a ‘golden’ age? Ps label features; Ps to find out (using the internet in their own time) why, and where, is Elizabeth’s hand resting on the globe? Whole class discussion of earlier Elizabeth picture (1547). Ps identify and annotate features on IWB. How does Elizabeth seem to have changed over this period of time? Brief plenary on how understanding of pictures has been developed through discussion.</td>
</tr>
<tr>
<td><strong>Lesson 2</strong>&lt;br&gt;Aims</td>
<td>– To understand the problems faced by Elizabeth and consider how she might tackle them.</td>
<td>Recap on religious problems during reign of Elizabeth. T introduces Spanish problem; Ps discuss and vote on which options should Elizabeth take, recording ideas on IWB. Ps note arguments for and against marriage to Philip, using handout to find out more information. T circulates. Discussion of conflict at sea. Ps write sample arguments for and against on IWB. Ps record own ideas. T introduces question on IWB of what Elizabeth should do about poverty, crime and unemployment. P annotates to suggest how these are linked.</td>
</tr>
<tr>
<td><strong>Lesson 3</strong>&lt;br&gt;Aims</td>
<td>– To examine the reasons for poverty in C16th&lt;br&gt;– To look at how effectively Elizabeth dealt with poverty</td>
<td>T recaps on link between poverty, crime and unemployment – revisits saved P annotations. T introduces ‘classification of causes of poverty’ activity (Heinemann IWB resource); asks Ps to identify items they don’t understand; discusses / explains. T constructs definitions for four headings (social, economic, political, religious) drawing on P ideas. Ps work in pairs to sort causes under these headings; individuals come forward to drag items on screen; Ps record in books. T introduces Poor Laws. Ps consult handout; T questions to check understanding. Whole class discussion around Heinemann ‘idle or deserving’ simulation on IWB. T recaps: causes of poverty, Elizabeth’s government’s ‘solution’ – and issues that arose.</td>
</tr>
<tr>
<td><strong>Lesson 4</strong>&lt;br&gt;Aims</td>
<td>– To consider how Elizabeth might tackle the problem of Mary</td>
<td>T recaps Poor Laws (Heinemann software); Ps discuss further examples. (Homework: to discuss with parent/s on effects of Poor Laws.) T introduces ‘Elizabeth’s problem: Mary, Queen of Scots’ on IWB and explains how problem developed (handout). Ps add thought bubble to picture of Mary on IWB. T shows example produced by colleague Ts. Ps compare.</td>
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</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Lesson aims</th>
<th>Lesson content</th>
</tr>
</thead>
<tbody>
<tr>
<td>– To understand the decision to execute</td>
<td>Whole class discussion re options for Elizabeth. Ps annotate picture with thought bubble on IWB.</td>
</tr>
<tr>
<td>– To work out what were the reactions to the execution</td>
<td>Mary’s execution: source text displayed on IWB. Ps highlight key words showing (positive &amp; negative) reactions to Mary’s execution. Ps record. T circulates and discusses with class.</td>
</tr>
<tr>
<td></td>
<td>Picture of Mary’s execution (Heinemann) displayed on IWB. Ps annotate key elements.</td>
</tr>
<tr>
<td></td>
<td>T summarises; debate continues regarding how successfully Elizabeth had solved the problems of poverty and Mary.</td>
</tr>
<tr>
<td>Lesson 5</td>
<td>Recap on execution of Mary Queen of Scots using picture and narrative sources. T uses statements on OWB as framework for discussing importance of multiple sources in gaining understanding of the event.</td>
</tr>
<tr>
<td>Aims</td>
<td>T questions pupil in role as Philip II of Spain. Answers reveal why he is angry with Elizabeth and about to launch an invasion of England.</td>
</tr>
<tr>
<td>– To understand why the conflict between England and Spain reached a head in 1588</td>
<td>Ps note down reasons for Spanish plan to invade.</td>
</tr>
<tr>
<td>– To examine the Spanish plans for attack and the English plans for defence</td>
<td>T introduces Spanish Plan using IWB. P invited to plot route of Armada on map.</td>
</tr>
<tr>
<td>– To examine the reasons for the defeat of the Armada</td>
<td>Ps note strengths and weaknesses of the plan. Feedback on IWB; discussion.</td>
</tr>
<tr>
<td>– To use sources on the execution to raise issues about historical evidence</td>
<td>Repeated with English defence plan. Ps use textbook to discover sequence and outcome of events then identify key events. Examination of evidence on the reasons for the defeat of the Armada; Ps annotate text on IWB. T discusses.</td>
</tr>
<tr>
<td></td>
<td>T summarises: What contributed to the Armada’s defeat? Can all evidence be trusted? Did the defeat of the Armada solve the problem of conflict with Spain?</td>
</tr>
<tr>
<td>Lesson 6</td>
<td>Recap on Armada route and attack and defence plans using slides from yesterday.</td>
</tr>
<tr>
<td>Aims</td>
<td>Review of text sources on IWB; Ps draw links between them – and explain reasoning.</td>
</tr>
<tr>
<td>– To finish work on, and review, the Spanish problem</td>
<td>Ps note key points re defeat of Armada. T summarises on OWB.</td>
</tr>
<tr>
<td>– To set up the assignment by developing a writing frame</td>
<td>T introduces assignment question: ‘How successfully did Elizabeth and her Government tackle the problems they faced?’ Armada portrait is revisited.</td>
</tr>
<tr>
<td></td>
<td>Recap/discussion on problem of poverty drawing on homework about Poor Laws; Ps annotate writing frame on IWB.</td>
</tr>
<tr>
<td></td>
<td>Ps produce and share lead sentences for opening sections of assignment. T highlights chronology of events. Ps complete plan for homework.</td>
</tr>
</tbody>
</table>

*T = teacher; P = pupil*
use of both digital and non-digital tools and resources, centring on developing whole-class use of the IWB.

From the outset of the study, Lloyd kept a project diary, intended to capture brief reflections about aspects of planning and teaching the lessons that seemed noteworthy at the time. These documents became part of the shared data set which revealed insights into the personal philosophy underlying and permeating Lloyd’s approach to teaching, which itself ultimately shaped the development of our analytic framework.

Overarching Aims and Objectives: First Order and Second Order Historical Knowledge

Before examining the themes that emerged through our analysis, we look briefly at what teaching and learning history means in broad conceptual and curricular terms, to show how Lloyd’s aims and objectives for the sequence were contextualised within this subject focus.

History learning has been analysed into two distinct domains: first order, or substantive, knowledge and understanding, and second order, or disciplinary, knowledge and understanding (Howson, 2007; Lee, 2005). Learning history is thus not only about developing understanding of past actors, events and states of affairs and of substantive historical concepts necessary to this task (such as the concept “feudalism”, for example). It is also about mastering the concepts that historians use to construct claims about the past, such as “evidence” and “significance” (Lee, 2005; Wineburg, 2007).

A focus on key concepts and processes as much as on substantive historical knowledge – as associated with the philosophy of the Schools History Project tradition (Shemilt, 1980) – had become integral to the National Curriculum for history in secondary schools in England (QCA, 2007):

As they develop their understanding of the nature of historical study, pupils ask and answer important questions, evaluate evidence, detect bias, identify and analyse different interpretations of the past, and learn how to substantiate any arguments and judgements they make. (QCA, 2007)

Lloyd’s scheme of work had been devised with these dual objectives in mind. However, a number of considerations underpin the focus on second-order knowledge in contemporary history education. They range, on the one hand, from the view that learners need to understand the basis of the claims that substantive historical knowledge comprises, to the argument that a focus on knowledge construction is essential to the education of informed and empowered citizens in a democratic society. As Barton and Levstik have argued:

Preparing students to make reasoned judgements cannot be accomplished by telling them what to think; preparing them to move beyond their own perspective
cannot be accomplished by demanding reproduction of a consensual narrative of the national past; and preparing them to take part in collaborative discourse about the common good cannot be accomplished by tightly controlled, teacher-centered instruction. These goals can only be achieved when students take part in meaningful and relevant historical inquiries, examine a variety of evidence, consider multiple viewpoints and develop conclusions that are defended and negotiated with others. (Barton & Levetik, 2004, p. 260).

Aligning with this view, Lloyd saw the classroom processes of “generating ideas and thinking about different problems” as working towards “a deeper understanding of some of the complexities and issues”. Within the videoed sequence, this work was supported by use of technology and involved use of causal reasoning: classifying, prioritising and then interlinking reasons and distinguishing cause from association and cause from effect. (See for example, Episode 3.2 in relation to poverty, and Lesson 5 concerning the defeat of the Armada).

Skills of historical inquiry are promoted by drawing inferences and producing warranted claims about the past (including recognising relevant elements of source material, evaluating its reliability and plausibility, recognising a need to incorporate multiple sources, devising, debating, justifying and validating claims, developing generalisations through extracting and linking corroborating evidence). Lloyd taught these second-order concepts through subtly modelling what “doing history” involves, in terms of historical analysis and inquiry, and building up these understandings over time in different contexts.

Analytical thinking was fostered through careful task structuring, for example in Lesson 1 (see Episodes 1.1 and 1.2 below), firstly identifying salient features of portraits of Elizabeth and drawing inferences about a “golden age” from those features, then taking the opposite approach of looking for conclusions and trying to relate them back to images and other sources. In Lesson 3, generalised statements about events and factors influencing outcomes were also linked together – highlighting both similarities and causal sequences.

However, Lloyd’s aims concerning the evaluation of claims and evidence went beyond application of analytic skills in the historical domain to modelling these approaches as transferable or “life” skills:

10 or 15 years ago, we were very much teaching children about “This is what an historian does”, and we were practising skills of the historian ... and we were talking to Year 7 [age 11–12] kids about “These are all his/her primary sources, secondary sources … Now you’re thinking about transferable skills, important life skills: how to read the newspaper, how to analyse the news, how to analyse things that you use at work, how to judge events and people ... where to go to find out information. (Meeting)

I think education is about creating rounded citizens ... and there are a number of ways in which you do that, skills that you need, and qualities that you need
to develop … and one of them is the weighing of evidence. But it’s also being confident enough to be able to present your views on that. (Interview)

*Fostering a collaborative environment* in which pupils could gain confidence in formulating, articulating and sharing their views was Lloyd’s overriding pedagogical concern.

**Use of Technology Resources**

Lloyd’s classroom was equipped with a network computer linked to the internet, a static interactive whiteboard, with an ordinary whiteboard (OWB) alongside, and data projector. He planned to use a variety of digital resources in the filmed lessons, some of which were materials sourced from the internet such as images of Elizabeth I (Figures 2.2 and 2.3) and others that he devised himself such as the summary of the Spanish plan of attack (Figure 2.6), and collections of statements drawn from historical sources (Figure 2.7). While much of the module had been designed collaboratively within the department for previous groups, Lloyd was keen to develop further IWB activities by “adapting strategies already used, and creating new ones”. (Diary)

In addition, two of the six lessons drew on an educational CD-ROM (Heinemann, 2004b: Think History) that included audiovisual dramatisations of historical events such as the execution of Mary, Queen of Scots, and an interactive simulation of trials conducted under the Poor Laws.

A systematic categorisation (using the video data) of teaching modes across the six 1-hour lessons we filmed showed that the IWB was used for direct whole-class teaching for 63% of the total lesson time. Additionally, 10% was individual/pair work directly referring to the IWB. For 22% of lesson time there was no IWB use, with a further 5% mixed mode activity. Note that these figures (presented in each case study chapter) are merely intended to help describe the context; no judgment was made by the research team about how often the IWB was used, although alternative potential strategies were of course discussed on occasion.

Although Lloyd himself was still getting to grips with the technology and only beginning to understand the potential of its functionality at this time, already he had started to exploit many of the tools and features available. The strategies he used and his rationale for employing them already lent impetus to his lessons, but he was keen to keep on extending practice, as our conversations revealed.

Within the series, we explored and identified how Lloyd used IWB tools and resources in communicating and developing complex ideas and modelling historical thinking processes through:

- capitalising on *increased availability of multiple sources*: drawing on a wide range of high quality images, texts, audio clips and simulations offering historical source materials for interaction and manipulation;
CHAPTER 2

• using textual annotation extensively (including labels, links, thought bubbles, agree-disagree via marking with tick or cross) to facilitate public sharing, generation and recording of ideas, to make inferences and crystallise causal reasoning, to assess historical decision making, to encourage pupils to respond to peer contributions, and to engage pupils and “give proposers a stake” in the discussion;

• using graphical annotation features (including underlining, circling, coloured highlighters, shading and box outlining) as analytic tools, for example to render complex ideas and historical language more concrete and salient, to reduce “cognitive load” and to build up a vivid picture;

• focusing using spotlighting, magnification, and hide and reveal to zoom in and investigate detail, to maintain attention on key concepts and relationships, or to conceal and reveal “correct” answers;

• using drag and drop functionality to facilitate discussion and practice of classification.

In these ways, we saw technological resources being used as visible, manipulable, dynamic objects of joint reference within the classroom and as scaffolds and stimuli for analytical thinking.

Lloyd’s purposeful use of digital resources alongside non-digital materials, in support of both his curricular teaching aims and general pedagogical approach, is illustrated in later examples and elaborated in the next section.

THEMES IDENTIFIED

The pattern of individual and joint video review common to all of the case studies was outlined in Chapter 1. Lloyd’s commentary here reflected his position as teacher of the class while Rolf acted as designated colleague practitioner. Video files were also sent to Arthur, who returned comments that were circulated to the rest of the team alongside the combined grids, prior to our review meetings. Arthur also joined us for the fourth team meeting, held at school, when we looked back together over the sequence of lessons as a whole, identified emerging, overarching themes and considered how we could portray those on the planned CD-ROM resource.

The key themes (highlighted throughout the text using italics) are summarised in the following diagram (Figure 2.1), which also represents the highly interrelated way in which we saw them as being linked with each other. In particular, although not all elements in the diagram are directly connected within the graphic, their inclusion within the shaded background ellipse is intended to denote the close interplay between them. (An interactive version of the diagram with hyperlinks to video clips and other material illustrating the themes appears in the multimedia resource at http://t-media.educ.cam.ac.uk/).

Lloyd’s design of the lesson series promoted two important curricular aspects of historical learning: historical knowledge and skills associated with the discipline. Lesson tasks and activities were thoughtfully devised in ways that exploited
technology to support these dual objectives. In addition, the classroom ethos that Lloyd fostered was one of collaboration and inter-dependence. Our analysis distinguished contributory elements as a blend of collegiality, challenge and subtle teacher intervention to shape thinking. These aspects, alongside other strategies such as rehearsal, archiving and revisiting digital material and integrating ICT and non-ICT resources are discussed below.

We now present four examples of critical lesson episodes, collectively identified, to illustrate the major themes that emerged from our analysis. We then trace how our own process of collaborative review played out through further examples of how we as a research team came to deepen our understandings and develop a shared language for analytic description.

Episodes 1.1 and 1.2: Collaborative Interpretation of Images to Introduce Elizabeth I and the ‘Golden Age’

In Lesson 1 Lloyd introduced the key idea for the whole sequence: “The ‘golden age’ of Elizabeth I” through discussion of the Armada portrait displayed on the IWB (Episode 1.1). His aim here was to “engage the kids, to hook them straight away by looking at the picture” (Interview 2).

Pupils came forward to annotate features they perceived as indicative of a ‘golden age’ and explain why they had selected these (see Figure 2.2). They labelled ‘jewellery’ and noted the lavish clothing as ‘posh’ and ‘expensive’. Seeing the Armada in the background, Michael labelled ‘winning battles’. Lloyd then used the IWB spotlight tool to focus on particular parts of the image, firstly one that pupils had already noted: Elizabeth’s face and hair (Ellie suggested that the queen’s pale face shows that “she is rich and she doesn’t go out”).
He then moved the spotlight onto the globe and asked, “What does this mean?” Lizzie said, “She’s in control”, while Josh volunteered, “Does this mean she rules the world?” Lloyd suggested that there was a “very specific meaning”, and challenged pupils to find out the answer (using the internet) within the next few days. (The class returned to this slide in Lesson 6 and Lloyd used the zoom tool to show that Elizabeth’s hand was resting on the North American colonies – and briefly discussed the historical implications of this.)

After showing the Armada Portrait, Lloyd projected an earlier portrait of Elizabeth (Episode 1.2; Figure 2.3). When volunteers had added descriptive labels around the picture, he invited others to connect these labels with features of the image. In doing so, Lloyd wanted them to “guess the thinking of others and extend their own knowledge”.

Collaboration will allow some pupils to see things they hadn’t spotted or had thought about in a different way. (Grid comment)

For example, after Lizzie had written, “Doesn’t care about looks”, Jane was asked to come forward and show why. Jane circled the face and explained “it’s because she’s not wearing make-up”.

Here, use of the IWB’s annotation, spotlight and zoom features supported building up a vivid picture of this key historical character, helping pupils in turn to understand her motives and subsequent events. Lloyd deliberately exploited the IWB functionality to develop both first- and second-order historical thinking. Further, he used technology to co-construct historical knowledge and understanding so as to empower pupils as learners.
Episodes 3.1 and 3.2: Co-constructing Knowledge about Poverty in Elizabethan Times

At the end of Lesson 2, Lloyd introduced some of the many problems that beset the Elizabethan era; Lesson 3 then focused on two main questions concerning Elizabethan social policy: what were the causes of poverty, and what did the government do to respond? Answering these questions entailed developing substantive first-order knowledge. At the same time, pupils needed to know and understand specific features of the Elizabethan context: for example, why there were so many landless labourers. In his commentary, Arthur pointed out that these topics can pose particular difficulties when learners draw on preconceptions based on their contemporary experience and their assumptions about how the world works. Appreciating this situation also required development of substantive conceptual understandings about, for example, the distinction between social and political problems and processes. It was here that second-order knowledge was brought into play, since answering questions about causes involves developing the ability to link factors together and identify hierarchies of importance amongst causes (Chapman, 2003; Chapman & Woodcock, 2006).

Episode 3.1: Archiving and Revisiting Learning

In this sequence, Lloyd used the IWB’s archiving and revisiting facilities to help his class explore the relationships between factors of poverty. In his introduction to the topic at the end of Lesson 2 he had invited pupils to suggest sequential and hierarchical relationships between factors by annotating a whiteboard slide (see Figure 2.4); Dan came forward to order three perceived problems for Elizabeth.
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This slide was archived and then revisited at the start of the next lesson as follows:

Can I take you back to where we were when Dan came up from his seat and he linked together poverty, crime and unemployment in the last lesson? … Dan can you just remind us why you said number 3 comes first, then number two, then number 1? (Lloyd, Lesson 3)

Revisiting annotated IWB slides and other stored materials can serve to draw on shared experience and previously co-constructed knowledge (reigniting, see Chapter 3), and to consolidate and synthesise these in the process of building up understanding of the events, thus “adding value” beyond that available with other forms of ICT. In this instance, we noted how Lloyd deliberately built on a learner’s contribution rather than simply recalling teacher-generated materials to develop the lesson theme, as might conventionally happen in the classroom. The novelty of this episode prompted a fruitful discussion among the review team, as described later in this chapter.

Episode 3.2: Using the IWB and non-IWB Resources to Support Collaborative Development of Understanding

The following example illustrates how Lloyd integrated ICT and non-ICT resources in a co-constructive pedagogic strategy to build substantive pupil knowledge and understanding of the past in a way that simultaneously developed, applied and consolidated emerging knowledge.

Following the opening episode described above, Lloyd went on to project an interactive slide from Heinemann’s Think History series that listed factors of poverty (such as “less help from monks”). The slide was designed to promote categorisation of these factors through dragging and dropping them under broader conceptual headings (e.g. “social”). Prior to focusing on categorisation, Lloyd discussed the meaning of the individual factors with the class. Lloyd did not tell the pupils what the situation was directly, but asked them to make suggestions about the factors that may have caused poverty at the time and also to make suggestions about the meanings of the factors identified on the slide.

The emphasis was on interaction with the text on the board – pupils were asked to come to the front and point to items on the slide that they “were unsure about”; the rest of the class were then invited to volunteer explanations, and these were recorded.
on the ordinary whiteboard (OWB) (see Figure 2.5). The lesson then moved to a broader level of analysis, focused on categories under which the factors could be grouped. Again, the emphasis was on the joint clarification of the meaning of these categories.

Once all the broad terms had been defined, pupils worked in pairs to decide in which category they would place each factor, whilst Lloyd circulated and supported individuals, praising and clarifying. Finally, in a plenary, pupils came to the front of the class to *drag and drop* factors under relevant headings. The class was asked to vote on whether or not they agreed with the decisions that their peers had made and individuals who had voted were asked to justify their choices in a way that called on them to explain and *share their understanding*. Lloyd’s reflection on the lesson confirmed his commitment to promoting active engagement in learning:

> The concepts were hard. In the end it doesn’t bother me too much if they haven’t understood all those classifications. I think what it’s about is actively trying to get them to work out what the causes of poverty were. (Interview 2)

**Lesson 5: Reasons for Defeat of the Spanish Armada**

The episodes outlined above also exemplify what we jointly termed *rehearsal*: supportive strategies that gave learners opportunities to express and develop their thinking prior to bringing ideas to the whole class or recording them on the IWB. These strategies included *paired discussion* as a *priming* mechanism that allowed pupils to formulate and trial their ideas. Lloyd’s interaction with individuals or pairs during these discussions was a means of *focusing and checking understanding* while backs of exercise books were used as a notepad tool.

At the start of the sequence on the defeat of the Spanish Armada in Lesson 5, Lloyd displayed an IWB text identifying the “Spanish plan” (Episode 5.1; see Figure 2.6) and briefly talked through it to ensure comprehension. Pupils were then tasked to discuss the plan in pairs.

> “What do you think of this plan? Just have a think about this with your partner for a minute. Just think: is there any part of the plan that you think could go wrong?” (Lloyd, Lesson 5)
CHAPTER 2

After this opportunity to consolidate understanding, assisted by teacher circulation and support, individual pupils came to the front of the class to annotate the plan on the IWB. They were encouraged to develop and justify their choice of possible problem. (The annotated slide was revisited in the following lesson.)

Later in the lesson, the key task was to infer reasons for the Armada’s defeat from texts displayed on the IWB. Here, the OWB was used first as a notepad for members of the class to sketch out ideas about the location of the Netherlands on a map of Europe that Lloyd had drafted. Whole-class understandings of the narrative events were built and supported through teacher–pupil interaction, integrated into the broader task of inferring reasons for defeat. We noted how this approach contrasted with the typical front of class exposition of events associated with a more conventional “transmission”-oriented classroom. The OWB diagram was then used by Lloyd to show the position and formation of the Armada as it moved up the English Channel. After suggesting why the Armada was defeated (based on prior knowledge and what they had surmised so far), pupils were given the task of making a quick list of the key points in the back of their exercise books, referring to pages in their history textbook as required. Lloyd then circulated to support individuals.

At the end of the lesson the class considered a selection of historical accounts of the defeat displayed on the IWB (Episode 5.2). At the beginning of the next lesson they suggested links between these interpretations (Episode 6.1; Figure 2.7).

During an interview after the lesson series, Lloyd reflected on how activity around the IWB appeared to contribute to successful engagement, and enabled him to shape thinking through guiding interactions:

The kids seem very interested in what other kids are writing on the board … Now whether or not that’s because they want to pick them up when they do something wrong, or just whether or not it’s to see if they come up with
the same sort of thing that they’ve got? And it’s very visual, you can see it; whereas if somebody gives a spoken answer in class, for some kids that’s just another person speaking. So here’s an alternative way to present ideas and try and build up some group understanding … a lot of the work’s been individual, but it’s actually been group work as well because everybody has been involved in using the whiteboard. (Interview)

Throughout the lessons, Lloyd rarely presented the “received” view of events explicitly, but increased sophistication and widened vocabulary through assistive open questioning and subtle funnelling (guiding) towards target interpretation. Providing a supportive environment was a critical underpinning factor in this process of eliciting and building upon pupils’ ideas. Rolf observed:

It’s about them and their place as a learner … you create a culture where it is perfectly all right to be wrong … and not understanding is all right. (Meeting)

**Interdependence and Collaborative Learning**

Underlying this approach was Lloyd’s commitment to developing a mutually supportive and democratic classroom culture in which the teacher is a collaborator and learner, respectful and encouraging of pupils’ contributions, “giving views equal status”. Lloyd was open to pupils’ thinking bringing fresh perspectives on historical objects and situations:

It’s very much that you come out of the lesson having learnt some new history based on what the kids have said … everybody has an equal stake in what happens. It’s trying to get away from “teacher as expert”. (Meeting)

The technology has given the focus, it’s made things interactive, it’s helped build some collective learning. It’s hopefully got kids to question what they’ve
thought as well. And it’s got them to think about things in different ways as well, the technology’s allowed some kids to see what other kids are thinking and then possibly change their perspective. So certainly that’s the case for me. And I think you do try to put yourself in a position of a pupil as well, when you are learning from other kids, you know: “Right, what’s this taught me and will someone else have learned something from that?” (Interview 3)

As he reviewed the lesson videos, Rolf also noted how the technology was being utilised to support the sharing of ideas:

One of the key things for me is the collegiate sense of learning, and the IWB plays an instrumental part … the fact that certain images and ideas are projected and pupils are invited to come to the front … that’s a focal point throughout the sequence … picked up by pupils in interview too; they could “see what the others are thinking”. (Meeting).

Lloyd judged that using technology had helped him to cover ground quickly, and in terms of perceived learner enjoyment, satisfactorily. However, he was characteristically cautious in making such attributions himself, preferring to ask pupils themselves directly:

I probably taught them as much in six lessons as I might have done in twelve without the whiteboard. They’ve probably enjoyed the lessons (most of them) generally. There will be bits of the lessons that they’ve not enjoyed. But I need to ask them that and see what they think. (Interview 3)

**Pupil Perspectives and Learning Outcomes**

For Lloyd, another important aspect of involvement in this research was our joint decision to offer pupils the opportunity to feed back about their experience of the lessons. Conventionally, this would have involved pupils being interviewed by an adult – perhaps Lloyd or one of the university researchers. In accord with his conviction that learners had both the capacity and insight to contribute fruitfully to research – as well as pedagogical – activity, and building on previous pilot work with members of his class, we included peer interviewing as part of the research design.

Two members of the class, nominated by Lloyd, were briefed by the university researchers about approaches to group interviewing before conducting a pilot interview and receiving feedback on it. Using a set of simple, semi-structured prompts, they then led discussions with a group of four other class members, both halfway through and straight after the lesson series.

The motivational effects of the IWB envisaged by Lloyd were corroborated by pupil reports that its use made lessons “more social” and “makes people want to get involved”. In particular, comments revealed the value pupils placed on
opportunities to share ideas – and how they recognised the contribution of technology in supporting this:

P1: If you’re just like working on your own you don’t discuss the answer and like find out more and people’s different points of view

P2: … so if you’re writing it on the [IWB], you can see what all the different ideas are. (Pupil interview 1)

Interestingly, as Rolf also noted, several pupils also talked in terms of “seeing”, as well as “hearing” others’ thoughts:

You can see more of people’s opinions, what they think about the fighting, a paragraph or whatever … ’ (Pupil interview 2).

Pupils also cited teacher questioning as a helpful aid to peer participation.

While data from the pupil interviews indicated a favourable view of the lessons overall, the depth of their responses may have been limited by the pupil interviewers’ lack of experience in probing techniques, and indeed the shortness of time available for post-lesson conversations. Nevertheless, Lloyd saw the pupils’ contribution as an important tool in developing the sort of democratic practice that he wanted to pursue. Reflecting on his role in supporting collaborative learning, he concluded that pupils’ perceptions of what they had learned from each other should be the arbiter of his success:

I’ve directed the learning, haven’t I? But … while I’ve directed things I’ve tried to use a very open-ended approach to the tasks. And so I think they’ve been fairly independent and hopefully they’ve been inter-dependent as well. But again I think we need to see from the assignments, but … perhaps there is a question to ask them, just on pupil voice … in the questions they’ve been asking each other … what have they learned from other people in this module? Which is not really a question that we ask very often. (Interview 3)

After the project, Lloyd set up the Pupils as Learning Partners scheme within the school in which pupils observed lessons, discussed them with the teacher and contributed towards lesson planning (see Chapter 8).

DEVELOPING INTERMEDIATE THEORY

While the case account presented so far has focused predominantly on the overlapping thematic dimensions of developing subject knowledge and strategic use of IWB technology, our discussions in review meetings constantly reverted to the central underpinning theme of interdependence: collaborative construction of knowledge. This theme concerns how Lloyd used the IWB technology to underpin his approach of fostering a supportive environment for active pupil participation and responsibility for their own learning. The role of dialogue emerged as critical.
In a talk given to colleagues in a teacher partnership group at the end of the project, Lloyd summarised succinctly how our process of review began to give rise to this key focus:

We discussed Lesson 1 all together. Now, through the first discussion, other things of interest began to emerge. Researchers introduced us to a wide ranging vocabulary to describe what was happening in the lesson ….

We were asked to use the vocabulary if appropriate to describe different parts of the lesson. As we commented on and discussed more of the lessons, more and more the interest shifted to the way the IWB facilitated pupil involvement and the kind of talk that was happening in the lessons. The word dialogic began to come increasingly into our descriptions/analysis of the lessons.

(Lloyd, presentation notes, 2007; italics added)

The following examples elaborate further how this interest translated into theoretical ideas that were refined through our discussions of the practice we had observed.

Example 1: Lesson 1, Review

The process by which the *a priori* framework (see Chapter 1) became encapsulated in our tentative coding scheme began in the first review meeting, with discussion of two terms introduced by the university researchers in comments on the first two lesson videos. These particular terms were derived from Mortimer and Scott’s (2003) framework for analysing communicative approaches:

*Dialogic interaction* – teacher and learners developing ideas together.

*Dialogic synthesis* – drawing together / building on / elaborating different views, but with no pupil input during synthesis. (Mortimer and Scott describe this type of activity as “non-interactive/dialogic” rather than using the term “synthesis”, which we considered more apt.)

Lloyd felt that coding needed to reflect episodes where learners built on each other’s ideas as well as responding to teacher questions. A new sub-code, *dialogic class discussion*, was added to the scheme. Definitions were further refined during Meeting 2 when Lloyd and Rolf suggested that pupils as well as the teacher could engage in *dialogic synthesis*, for example when summarising and weaving together points made during class discussion (either via the IWB or on paper, and in verbal or nonverbal form).

Exploitation of the IWB during this process was characterised using a variety of fine-grained themes, as illustrated in preceding sections. These included for instance focusing using IWB-specific features – *spotlighting, zoom, hide and reveal* – to investigate detail and to maintain attention on key concepts and relationships.

We have seen too, how one of Lloyd’s central aims, evident in his teaching, was to promote the role of pupils in each other’s learning. This commitment to fostering a culture of *interdependence* (his term) was corroborated by Rolf:
L: What is really important is for kids to listen and to learn from what other kids say.

R: That’s key to your approach because you model that by listening intently to students … So kids learn from that … in an atmosphere of appreciation and of mutual learning … “I have learnt so much from you today,” you’re saying at the end of one of the lessons, and that’s key.

Both teachers went on to distinguish between interdependence and collaboration, preferring the former as a more powerful descriptor. This led to changing the global thematic category increasing learner participation, collaboration and independence to increasing learner participation, interdependence and responsibility, reflecting Lloyd’s parallel aim for pupils to develop responsibility for their own learning alongside interdependence.

Later, in Meeting 3, discussion yielded finer distinctions between codes, including consideration of the teacher’s mediating role in dialogic “class” and “peer” discussion. The latter term arose as a further separate category in response to the assertion by Lloyd and Rolf that in some of the older groups (a Year 9 top ability set was mentioned), students engaged in productive dialogue within whole class discussion but without teacher aid (especially where grounding in this style of dialogue had been provided by earlier teacher modelling); fostering this approach was considered highly desirable. The teacher’s role was deemed to include, for example, assistive questioning and setting ground rules such as the requirement for participants to build on the previous speaker’s comments. Lloyd pointed out that once the discussion was set up, the teacher could enter as an equal participant. Dialogic peer discussion was not observed during the study, thus it was an ‘aspirational’ extension of a key code beyond grounded application in the data, sparking teachers’ ideas concerning possibilities for development.

During the review, we introduced teachers to wider literature including Alexander’s (2004) treatise on dialogic teaching. Lloyd subsequently shared these ideas within the department, and with the pupils. We received the following feedback from him via email:

The pamphlet has created quite a flurry of excitement! … Discussed some of the pamphlet ideas today with an able Yr 9 group after we had discussed whether the Holocaust was a unique experience. Where writing occurred, it was in response to student contributions. Teacher faded and actually became a contributor and learner. We then talked about the different roles people including me had taken in the lesson. Some consensus that some students, NOT the teacher, had provided the main points for others to reflect on/challenge/shape thinking. Hugely rewarding!!

Engagement with the research process clearly stimulated some creative development and critical analysis of practice in this instance.
Example 2: Discussion of Lesson 3 (see Episode 3.1 above).

We now return to the episode introduced earlier in the chapter where Lloyd revisited the slide that Dan had annotated in the previous lesson and linked together three issues that were problematic in Elizabethan times: poverty, crime and unemployment. A summary of the video clip from Lesson 3 follows.

Lloyd shares objectives: Today we will explore the causes of this poverty and what E’s government tried to do about it. Lloyd invites Dan to explain the order in which he linked these items. Dan: “Because if you are unemployed then you don’t have any income so you can’t buy food and drink and all the necessities. . . . Then it leads to crime because people just can’t think there’s any way else to get [them].” Lloyd asks if every poor person turns to crime. Class says “No”. Discussion continues as other students make contributions and Lloyd responds to them, identifying significant causes and ensuring that students are distinguishing between prioritization and causal linking (Dan had done the latter).

As mentioned, this episode reflects Lloyd’s strong commitment to encouraging an active learner role in collective knowledge construction, facilitated by exploiting the unique saving and revisiting annotations feature of the IWB. The class was building up a shared interpretation under the teacher’s guidance and orchestration; genuine openness and responsiveness to learner contributions were coupled with teacher elaboration and reshaping of pupils’ ideas. Lloyd describes this on the grid as follows:

Sometimes I will summarise responses from students but not always. I am consciously wanting the students to listen to their classmates for ideas. Teacher shouldn’t always mediate student responses. Such an approach can suggest that teacher must intervene to give an answer status.

He also points out that “when Becky contributes from the back, some of the kids turn and look at her – just emphasises the teacher isn’t the sole focus for ideas.”

Contextual information in this case was derived from the teacher’s interview comments which revealed his secondary motivation for crediting Dan (“because he’d done some brilliant homework that he’s emailed me, which I’ve marked, and he’s going to present it to the other kids”), otherwise obscured from researchers. Comments on his grid from Arthur, as subject specialist, illuminated the subject context, noting as unusual both the use of pupil decision making to create a link with the previous lesson, and Lloyd’s reference back to joint endeavour (“Can I take you back to where we were when Dan . . .”): “In most lessons I imagine that the link would be back to teacher exposition (or similar) or teacher questions”. Similarly, colleague Rolf noted on the grid: “This immediately acknowledges role of students in joint investigation”.

Our review meetings were necessarily time constrained and, inevitably, discussions had to be selective. Many intriguing issues raised in grid commentaries remained
unexplored. The following exchange around Episode 3.2 (above), illustrates how one new code was incorporated within our framework.

The four commentaries exhibit use of terms introduced by the researchers (bold type) and also reveal the different perspectives of the four observers. In her grid comments, Rosemary noted Lloyd’s parallel use of the OWB (Figure 2.5) and IWB (Figure 2.8). At the meeting, she asked him about his rationale for this approach, having also read Arthur’s more subject-oriented interpretation of the same episode, as in the following extract from his comments.

“Focus shifts to categories3 on the [IWB] slide – question ‘Can we classify these reasons? Can we put them into some sort of order?’

First approach… is to “work out what we think these words might mean” (referring to the categories). Same method as [T had used earlier] – call for pupil suggestions which are then fed back by T and built up into definitions on the OWB (key method here = tentative language4 to encourage contribution and T use of synthesis skills and explication skills – pulling together and glossing pupil suggestions; praise also important – e.g. “I like S’s phrase”). T indicates that the definitions will be used “in a minute.”

In his reply, Lloyd firstly noted what he saw as a drawback of the IWB, namely that only one pupil could write on it at a time, “whereas you can have many pupils writing up ideas at once on the OWB”. However, on reflection, he had wondered whether, in this lesson, it would have been better to write up the definitions on the IWB and flick between screens. Rolf pointed out that Lloyd would then have to control the board – and decide which alternate screen to display: “Having material on the OWB means that it supports IWB activity and is accessible to pupils throughout”. Rolf also wondered if Lloyd had planned in advance to use the two boards in this way. In retrospect, Lloyd thought he had probably invoked the approach spontaneously. Lloyd summed up his motivation for using both boards as

A way of publicly exploring the contributions the pupils had made; by putting up the definitions of the headings, you could probably link the IWB to what’s on the OWB.

Rolf thought that using the OWB “may have been quicker than IWB for this part of the activity – but more importantly you’ve got both of them there and can see everything there”. We collectively agreed to add a new code to our descriptive framework: $IWB + OWB$.

Another specialist from our Faculty reviewed the lesson as a whole (during a discussion with the university researchers after the standard review meetings had been completed) and highlighted the dangers of conflating evidential thinking with causal reasoning, or reliability with authenticity, and the need to treat bias constructively. These specialist contributions neatly illustrate another feature of our approach that was absolutely critical to its success, namely the bringing together of multiple, unique perspectives.
### CHAPTER 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Commentary</th>
<th>Teacher</th>
<th>Colleague</th>
<th>Researcher 1</th>
<th>Researcher 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T wonders if Ps can classify reasons, put them in some sort of order. Asks Rachel what is meant by ‘social’ cause. R: Does it mean you’ve got a job and now you’re doing it and whatever? T: Can we build on that?</td>
<td>T uses OWB to record answers – perhaps for speed, and so pupils can refer to it and look at the next task.</td>
<td>T effectively gets R to elaborate her initially dubious answer</td>
<td>Challenge</td>
<td>Language signals collaborative approach to task</td>
</tr>
<tr>
<td></td>
<td>Clare: How different people get along. T writes ‘social’ on OWB: ‘A social cause of poverty.’ Agrees it’s to do with people. Notes on OWB. Society seems to be about how people are together. Dan suggests it has to do with treating poor people badly and stuff like that.</td>
<td>T absorbs and builds on Ps’ ideas but seamlessly moulds them towards ideas he wants to get across (reshaping thinking through subtle funnelling).</td>
<td>D helpfully makes link with discussion just passed</td>
<td>Dialogic style</td>
<td>* some targeting?</td>
</tr>
<tr>
<td></td>
<td>T writes ‘Economic’ on OWB and asks Mary for ideas on this. M: Is it when you can just get by? T: Yes, keep going. Ashbal mentions ‘bad harvests’. T agrees that this has to do with the economy and comments upon the relationship between harvest, jobs and wealth creation. T writes up definition: ‘how money is created’. James adds: Using more natural resources, not like buying something, you can go and make it.</td>
<td>T absorbs and builds on Ps’ ideas but seamlessly moulds them towards ideas he wants to record / develop ideas that will feed into IWB activity</td>
<td>T absorbs and builds on Ps’ ideas but seamlessly moulds them towards ideas he wants to record / develop ideas that will feed into IWB activity</td>
<td>Informal assessment?</td>
<td>Parallel use of IWB and OWB (using latter as notebook to record / develop ideas that will feed into IWB activity)</td>
</tr>
<tr>
<td></td>
<td>T writes ‘Political’: Seth: The government isn’t helping. T says this is a perfect description and notes it on OWB. Lara adds: There’s nobody to help. T likes Seth’s phrase ‘not helping’ and uses it as a further definition under both ‘Economic’ and ‘Social’.</td>
<td>T absorbs and builds on Ps’ ideas but seamlessly moulds them towards ideas he wants to record / develop ideas that will feed into IWB activity</td>
<td>T absorbs and builds on Ps’ ideas but seamlessly moulds them towards ideas he wants to record / develop ideas that will feed into IWB activity</td>
<td>T capitalises on S’s phrase but affirms all P contributions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T writes up ‘Religious’: Lizzie thought that changes in religion meant some people were looked down on. T notes comment on OWB.</td>
<td>T absorbs and builds on Ps’ ideas but seamlessly moulds them towards ideas he wants to record / develop ideas that will feed into IWB activity</td>
<td>T absorbs and builds on Ps’ ideas but seamlessly moulds them towards ideas he wants to record / develop ideas that will feed into IWB activity</td>
<td>Informal assessment?</td>
<td>Parallel use of IWB and OWB (using latter as notebook to record / develop ideas that will feed into IWB activity)</td>
</tr>
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Note. Both researchers also marked this as a significant episode.

Figure 2.8. Extract from combined grid, history Lesson 3.
Teacher Perspectives on the Process

Both Lloyd and Rolf expressed appreciation of their involvement with the project, seeing it as a spur to their own professional development, as well as having potential application in wider school initiatives. Lloyd explained:

> It’s the opportunity to have my own awareness of different issues raised. That’s probably, for me personally, the most important thing; the opportunity to think things from different points of view and different perspectives, ways of thinking about things that I’ve not done before. That’s what keeps you fresher in your work, isn’t it? And also working with the people that I’ve been working with. I mean team work’s important to me, I think, and working with all the people in an atmosphere of trust is vital, very, very important indeed – so I’ve really, really enjoyed that.

Nevertheless, being under such close peer scrutiny, undertaken with the aim of wider sharing among a professional audience, also generated a sense of vulnerability:

> I suppose in my mind I’m thinking the outcome of this would be a useful development tool but there’ll be lots of people who might watch something like this and say, “That’s not very good…,” so that’s in the back of your mind, I guess, that some people think like that. Not for me that that’s a particularly big issue, because it isn’t. (Follow up interview)

Overall, Lloyd welcomed the sense of challenge that involvement brought, viewing it positively as “having to think through your ideas”. In particular, he found it interesting to tease out nuances relating to dialogue:

> I really enjoyed that and I think I learned a lot from that, and it’s something I can, you know, reflect on and use in planning in my teaching.

At the same time, he still had considered reservations about the relevance of some academic research (as encapsulated in theoretical terms introduced by the university researchers) to teachers’ work. Yet perspectives introduced by the university researchers in relation to what they observed had ultimately stimulated new avenues of analytic thought:

> The broader sense [of it] for me was about thinking about how relevant is that academic research to teachers’ work. Well it is, some of it. It has to be, because it’s clear that what is being described is happening. It’s just, I suppose, whether or not some of those earlier definitions of those terms need some change or need adapting to make it more relevant to the classroom, to teachers …

What are academics looking for, and what would teachers see as no big deal at all, and many of those codings – well, I would probably never have even commented on if I was perhaps watching a lesson or if I was thinking about the lesson that I’d watched. So it’s almost like the codes were becoming used
by me, for my own purpose, to try and look at aspects of my teaching that I found interesting.

From a personal point of view this has really crystallised some of my views—more than anything I’ve done for a long, long time, and hopefully will be useful for wider dissemination in school.

ARTHUR’S PERSPECTIVES ON INVOLVEMENT IN THE REVIEW PROCESS

As a teacher and teacher educator who had observed and commented on many lessons during his career, Arthur’s reflections on his role in the review process reveal various ways in which involvement extended his own professional experience and enriched his thinking and practice:

I had observed individual lessons many times... as part of peer or line-managerial observations of colleagues and I regularly observed student teachers teach individual lessons as part of the formative and summative assessment of their teaching practice placements as a teacher educator or mentor. Such observations were limited in two respects: they were observations of individual lessons, rather than observations of a lesson sequence; they were also observations framed by assessment criteria of various kinds (criteria related to institutional models of good practice related to inspection criteria or criteria related to standards for qualified teacher status). Inevitably, in the case of line-managerial or student teacher observations, such observations were high stakes for both observer and observed. Such observations were also ‘real time’ and not filmed.

I had never before had the opportunity to watch and review a sequence of lessons taught by a highly experienced history teacher. Also, I had never been asked to observe in a criterion-free context where my task was primarily to think about the learning, in and of itself, and to theorise what was happening for its own sake—in order to understand and model it rather than to evaluate. It was fascinating to be able to watch and re-watch lessons minute by minute and to think about both what ‘was happening’ (surface phenomena) and what ‘was going on’ (the pedagogic rationale and learning processes underlying surface phenomena).

Nevertheless, he was also very much aware that his comments would be open to evaluative interpretation by Lloyd and Rolf, and to potential scrutiny by a wider field:

My observations were high stakes in this context also, particularly, I imagine, for Lloyd whose practice was being closely observed, but also for me, as my theorisation of practice was being made publicly available for scrutiny by colleagues, including a respected history education colleague [the other
SUPPORTING KNOWLEDGE CO-CONSTRUCTION IN HISTORY

T-MEDIA subject specialist]. I was a little nervous, I think, at the start of the whole process, therefore! As things turned out, however, there was no need to be: my developing understandings of what Lloyd was doing and of what was going on in the lessons seemed to be consistent with or complementary to the understandings emerging in the rest of the team.

Having opportunity to share, expound, and come to common understanding within a collegial space was helpful in mediating anxieties about the potential for misunderstandings to occur. However, over the course of the project, it became evident that Lloyd’s pedagogical outlook was very much in sync with Arthur’s.

It was very interesting also to have the opportunity to discuss lessons and a sequence of lessons with a team of colleagues with differing interests and differing sets of assumptions about how teaching and learning should be modelled and analysed. It was interesting to talk to Lloyd and we were very much in agreement about most things, I felt.

Arthur’s contribution as academic subject specialist brought a critical lens to bear which we as researchers found particularly useful. There was also a measure of exchange in terms of introducing theoretical ideas and viewpoints with which we were familiar. His comments confirm that these processes of knowledge sharing had been of mutual benefit:

It was interesting, however, to note where there were divergences: as a history education academic, rather than a school teacher, I think I could afford to be little more ‘purist’ about the history-specific (rather than transferable skills) aims of history education and I thought much more in those terms when describing what I understood Lloyd to be aiming to do. It was particularly interesting to work with T-MEDIA colleagues on this as we started out from rather different positions. My background was very much informed by cognitivist approaches to teaching and learning5 and I did not know very much about sociocultural theoretical frameworks (such as Wertsch, 1998) at the start of my participation in the project. There were considerable overlaps in our approaches, however, as it turned out.

The conceptual framing from which some of our terms derived, and the intermediate theory that took shape through our discussions, gave rise to additional vocabulary that Arthur subsequently found useful in his own practice as teacher educator, as elaborated in Chapter 8. The process of lesson review itself stimulated deeper thinking about pedagogical strategies for supporting history learning:

One issue that struck me particularly whilst commenting on the lessons was the difficulty I had in separating out uses of technology from teacher actions with a history-specific rationale: I learned a good deal from thinking about these lessons about how the IWB could be used to supplement and enhance interactions whose core rationale seemed to me to be history pedagogic.
CHAPTER 2

Focusing on the technology itself, Arthur concluded that commenting on the lessons and working on the T-MEDIA analyses had been very valuable in developing his thinking about the scope and uses of the IWB and had greatly enhanced his subsequent use of the IWB with his own adult students.

SUMMARY AND CONCLUSIONS

Aside from the substantive findings, the research has illustrated how collaborative microanalysis of lesson videos makes implicit rationale, values and routine practices more explicit, and how they can be used to engage teachers in deep reflection, critique and debate. We know from our interviews, including a follow-up study one year later, that the rich opportunities afforded for engagement in professional dialogue and scholarly analysis were highly valued by all of the T-MEDIA teachers (Hennessy & Deaney, 2009b). This approach offers a significant professional development opportunity – both for the participant who is filmed, and subsequently for other practitioners viewing the material; these kinds of impact are described in Chapter 8.

NOTES


2 IWBs now offer a dual screen functionality supporting two concurrent digital screen displays.

3 See Chapman (2003) regarding teaching causal reasoning and some of the problems that doing this poses.

4 Pitch is also used here – e.g. the phrase “how money is created” … is given a rising inflection indicating that the definition being offered is open for further comment/questioning rather than being definitive.


This chapter was closely based on an article co-authored by Deane, Chapman and Hennessy in the Curriculum Journal 2009, 20 (4), 365–387 [©Taylor & Francis]. The article entitled ‘A case study of one teacher’s use of the interactive whiteboard to support knowledge co-construction in the history classroom’ is available online at: http://www.informaworld.com/smpp/content~content=a917657303.