Multimodality, orchestration and participation in the context of classroom use of the interactive whiteboard: a discussion

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This paper will offer a discussion of the literature concerning multimodality, orchestration and participation related to classroom use of the interactive whiteboard (IWB). Specifically, it will explore the place, or potential use, of the IWB to resource a multimodal approach to teaching and learning, emphasising the complex connections that need acknowledging when viewing the IWB in context. Comments on the IWB’s effectiveness or otherwise, however, are beyond the scope of this paper. Conceptions of the role of language in mediating other modes and media, in terms of its centrality or complementarity, will necessarily be addressed by considering activities such as classroom talk aligned to other resources. The role of various actors (including teachers and learners) in designing, orchestrating and interpreting multimodal material will be considered. Whilst recognising the substantial debate regarding multimodality as an analytic lens, the discussion will focus on multimodality in terms of materials used in the classroom.

Keywords: multimodality; orchestration; participation; interactive whiteboard

Introduction

The main aim of this paper is to explore the place, or potential use, of the interactive whiteboard (IWB) in resourcing a multimodal approach to teaching and learning. It will do this by reviewing the research literature concerning IWB use in the classroom, largely since 2002 (for details see ‘Article selection’ on page 213). Assessment of the effectiveness of the IWB and its use, however, is beyond the scope of this paper (for a discussion of the impact of IWBs see Smith, Higgins, Wall, & Miller, 2005). This discussion arises because we are moving more towards a multimodally resourced classroom environment and the IWB is one of the many tools available to the teacher for engaging pupils on their learning journeys.

In addressing notions of a ‘multimodal approach’, we draw on Jewitt’s (2009) view of ‘multimodal communication’, defined in relation to situations ‘where there are degrees of combinations of different modes’ (p. 301). Such a multimodal approach to classroom use of tools and resources can be considered within a broader cultural shift away from written text per se to the use of images, sound, and so on. Within this, the role of the teacher in encouraging pupil participation involves the teacher’s ‘shaping’, or orchestration, of the numerous modes and resources used to support
learning of planned objectives and unplanned explorations. In fact in observing this
shift, Johnson and Kress (2003) highlight:

the facility afforded by the ‘new media’ for the easy production and use of a multiplicity
of modes of representation – sound, image, writing, moving image, speech – in the
message-entities that populate the screen. The screen is now the culturally dominant
medium in many parts of the world. (p. 7)

The term ‘new media’ is employed by the researchers here to refer to electronic
communication in various forms. In terms of ‘the screen’, the IWB screen is one of
the most visible forms of technology within the contemporary primary (elementary)
school classroom, and therefore one of the most evident arenas around which to
consider a multimodal approach to teaching and learning. This is certainly the case in
UK classrooms, where most of the research cited has been conducted.

It could be argued that the proliferation of new technologies has led to a culture
permeated by multiple modes and media, in which communication is becoming
increasingly more multimodal. Considering traditional practice, Schwartz and
Rubinstein-Ávila (2006) argue that the focus on print as text is largely due to ‘our own
socialization in a print-dominated world’ (p. 43), and they state that for today’s
learners, this needs to be re-addressed to more accurately represent pupils’ own
inherently multimodal and digital socialisation experiences. Increasing recognition of
the pervasiveness of digital technologies and multimodal experiences in pupils’ out-
of-school lives therefore is exposing a need to incorporate such tools within teaching
and learning, to enhance current and evolving pedagogic practice. This, however, is
no mean feat, involving many financial, safety and social implications for schools,
parents and pupils.

In this context an interesting question emerges: is it technology that is driving us
towards multimodal communication or is it, as a number of researchers such as Jewitt
or Kress suggest, that all communication is and always has been inherently multimodal?
It is this question which has prompted the discussion which follows and tackles
the concern here – to address how the use of new technologies such as the IWB can
resource multimodal processes of teaching and learning.

Of course in any discussion of this nature it is important to clarify what is meant
by multimodality. Drawing on definitions provided by Bearne (2003), Jewitt (2009),
and Jewitt and Kress (2003), mode can be considered as the form of the content, such
as image, writing or talk; while media refers to the vehicle through which information
is conveyed, such as television, a book or website. A document by the UK Department
for Children, Schools and Families for instance stated that:

- multimodal texts combine elements of:
  - gesture and/or movement
  - images: moving and still
  - sound: spoken words, sound effects and music
  - writing. (DCSF, 2007, n.p.)

Thus a multimedia message will always be multimodal, such as using newspaper
and radio bulletins to gather or present information. In contrast multimodal communi-
cation need not be conveyed through multiple media, such as simultaneous presenta-
tion of a picture and music on an IWB or projector screen.

With respect to the definition above, multimodality can be addressed as an
approach to teaching and learning through materials used in the classroom. But it can
also be employed as an approach to analysis. There is a substantial debate on the second of these two issues – how to analyse material multimodally. This paper, however, will focus on the first issue, namely the use and function of multimodal resources in the classroom. In this context we recognise the interplay of multimodal resources in the processes of teaching and learning and meaning-making, in which the role and potential use of classroom dialogue in particular is a contested area of the research.

The significance of classroom discussion and dialogue around teaching and learning resources presented via technologies such as the IWB is seen differently in the literature, in terms of its centrality or complementarity to other modes in play. These differences and any points of agreement or concession between the two views will be considered in terms of both written and spoken language and their relationship to IWB use. As well as the actual modes of communication, consideration will be given to the roles of those communicating within a multimodal classroom, namely teachers and learners. Exploring how various media and modes interact with each other, and how they are orchestrated and employed by users, is a key way to understand their significance for teaching and learning. How and why technology can be used in this way in the classroom will be considered, and some implications of this discussion for research and for practice will be offered.

Article selection

In preparing this discussion paper, an initial literature search was guided by special issue editions of journals addressing recent research on classroom use of IWBs. Further recent papers and texts cited in these articles were also accessed, in particular those published since 2002 which saw the start of a politically driven push to install IWBs into UK schools. This search was supplemented by using the database Academic Search Complete to identify papers and texts addressing multimodality, in reference to materials used in the classroom rather than multimodal analysis. Some but not all of these related to the use of classroom technologies. Finally, publications addressing classroom dialogue and dialogic teaching were also identified using the same database. Again some but not all related to classroom technology use. Where issues from the three strands intersect we find interesting insights into the use and perception of classroom resources, and these provide the basis for the discussion presented here.

The paper will now focus on the issues framed in the Introduction and Article selection, addressing how the literature portrays use of the IWB within a multimodal approach to teaching and learning, the role of language within such an approach, and the role of the various actors in communicating and interpreting multimodal teaching and learning experiences.

Using the IWB in fostering a multimodal approach to teaching and learning

With reference to the potential for new technologies, including the IWB, to facilitate a new means of presenting material, De Castell and Jenson (2004) suggest that one of the benefits of such technologies in class is that ‘new multimodally grounded attentional structures break up the attentional monopoly of the text’ (p. 390). Kemeny (2005) supports this idea, without suggesting reliance on technology, noting how the IWB’s functionality can be used to present a multimodal ‘hook’ to introduce concepts
or material, on which to build other concepts and resources throughout the course of a lesson or series of lessons. Likewise, Gillen, Kleine Staarman, Littleton, Mercer, and Twiner (2007) report a teacher’s use of the IWB to present a video of herself in her kitchen at home, demonstrating evaporation of water from a hot frying pan. Similarly to the idea of a hook, Gillen et al. suggest this provides an ‘anchor’ (drawing on the term introduced by Schwartz, Lin, Brophy, & Bransford, 1999) on which to build scientific knowledge. Whilst playing a video in class was previously possible, the IWB can support this activity without need for extra equipment and without an enforced loss of pace, as the teacher does not have to install or shift between pieces of bulky equipment. This, however, does not denote a new activity, and how the use of IWBs can facilitate new activities is where we now turn our focus.

Use of the IWB to resource a multimodal classroom experience is most strongly advocated with respect to what its use can add to lessons and learning that was not previously possible. For example, prepared material can be worked through as an advance organiser for the teacher, screens can be edited or highlighted directly onto the projected resource, and saved for future revision. These were findings observed by Miller and Glover (2002) addressing IWB use in five primary schools in a deprived area, and also Walker (2002), reporting a primary teacher’s IWB use to give mathematics a ‘whole class, inclusive feel’ (n.p.). Also not previously possible is the creation of a layered multimodal display on the IWB screen (illustrated in Figure 1 and the text below).

Annotation on the IWB of a frozen frame from a DVD allows control of pace and alignment of class discussion to the DVD stimulus, encouraging pupil participation and input (see Figure 1 below). The frozen frame can be used to capture pupil comments for future revisiting and revision, to re-resource future discussion around the DVD representation and the constructed meaning of its content that has been frozen in time. The annotated frame becomes an ‘improvable object’ (Wells, 1999) that is collectively visible and shared. The object can be worked on in the present,

Figure 1. Pupil annotating content on the IWB. Photo: Alison Twiner, 2006.
using material just seen in the recent past, in anticipation of future use of constructed and common knowledge (Littleton, Twiner, & Gillen, 2010). This can be seen to open a dialogic exploration rather than copying of content. Such activity instantiates Bereiter’s (1994) notion of ‘progressive discourse’, where teachers and learners use talk and resources to work on current knowledge or knowledge objects, to expand, revise and open up propositions for criticism. Whereas ‘standard’ text items can only occasionally serve as improvable objects, working on objects represented on the IWB offers the capacity for the whole class to suggest and potentially make changes to the display, and easily reverse them if required (e.g. Hennessy, Deaney, Ruthven, & Winterbottom, 2007; Hennessy, Wishart, et al., 2007 cite the potential to make and undo changes on an IWB display). In employing the IWB to host an improvable object, it is used to ‘give permanence to what is said’ (Wells, 1999, p. 116). It can also be orchestrated to support a temporary exploration of ideas, in a form of semi-permanence, until its purpose has been served and any changes can be discarded. In terms of multimodality, rather than isolated modes therefore, it is the combination, sequencing and easy alignment of information presented in different modes, resulting in a composite text, that use of the IWB can add to the classroom in addition to that provided by previous technologies.

Regarding such sequencing, how shared understanding is negotiated and unfolds over time is an increasingly acknowledged issue (Mercer & Littleton, 2007). Improvable objects, as mentioned, enter this timeline through the revision, or ‘improvement’, of knowledge artefacts worked on by collaborating participants, and offer a progressive and historical record of developing understanding. We can observe the role and revisiting of improvable objects on and off the IWB, in various modal forms, in teaching and in pupils’ ‘meaning-making trajectories’ (Baldry & Thibault, 2006). Thus the ‘long conversation’ (Maybin, 2006) of learning can be seen within the context of the various modal representations resourcing its development. Not everyone, however, is so convinced about this relatively new technological tool in the classroom.

Some researchers, such as Haldane (2007), urge caution over perceptions of the so-called ‘interactive’ whiteboard, where the name can somewhat problematically lead people to infer that interactivity is a property of the tool, rather than what users do with it. With this in mind, multimodality, interactivity and pace are commonly cited advantages of the IWB (Jewitt, Moss, & Cardini, 2007). However, how teachers see and make use of such potential advantages can vary significantly. Jewitt et al. describe how creation of separate IWB screens, and moving through a sequence of prepared screens, can fragment and compartmentalise learning, as opposed to leaving the ‘narrative trail’ evident (such as the workings of a problem). They conclude that ‘a multimodal, interactive and a fast-paced pedagogy are not necessarily good in and of themselves’ (p. 316). This view is also supported by Cutrim Schmid (2008), researching IWB use in English language classrooms. The extent to which learning is perceived as a ‘narrative trail’, as a cumulative, purposeful story of experience (to incorporate Alexander’s notions of dialogic teaching, 2008), can be reconceptualised through various interacting modes, but here we will explore how such cumulation can be supported via language in the classroom.

The role of language in learning
In addressing classroom discussion and dialogue around material presented via technologies such as the IWB, the role of language is seen differently in the literature.
It is conceptualised as either the glue that links together all other activated modes of communication such as image or music (e.g. Mercer & Littleton; Merchant), or as a mode which can be foregrounded or backgrounded like any other (e.g. Jewitt; Kress). These differences will be explored here, in terms of both written and spoken language. We will focus predominantly on the use of spoken language in the classroom, though we recognise also the significance of written language in mediating learning.

There is a clear stance in the literature that new technologies, including the IWB, and the increasingly multimodal nature of communication, are toppling a perceived dominance of text as written and spoken language: ‘The world of communication is multimodal, no longer reliant on language-as-speech or on language-as-writing alone’ (Kress, 2000, p. 139). Further to this, Jewitt and Kress (2003) argue that ‘a multimodal approach to learning starts from a theoretical position that treats all modes as equally significant for meaning and communication, potentially so at least’ (p. 2). In this they present a view that no one mode is more important or central in communication than another, though individual modes may be foregrounded at different points.

Other researchers however position language as at the heart of communication. Merchant (2007) for instance addresses the changing nature of digital literacy, in line with the changes in digital technology, but considers in spite of this, ‘there is little to indicate major changes that will threaten the centrality of written communication’ (p. 126). Thus the place of the IWB is potentially viewed as either one means of introducing information in a multitude of modes; or as a tool which is used to present written or spoken text, or material in a variety of modes that is supplementary to written or spoken text.

Within both views, however, there have been certain concessions. For those viewing all modes as potentially equal, it has been suggested that writing and written language remain critical even if just for the reason of ‘access’ to specialist domains such as science or mathematics (Johnson & Kress, 2003). Indeed Jewitt in 2005 also states a similar point in that ‘writing on screen functions to reference the values of specialist knowledge, authority, and authenticity associated with print’ (p. 323).

For those arguing for the central role of language there is a concession that the nature of writing is changing, from hand-produced lettering to letters produced by pressing buttons on a keyboard. Within both views there is agreement that the notion of what constitutes a text, traditionally a written document, is changing, with the increasing presence of orchestrated interplays amongst various modes in the same communicative event or resource.

In terms of language use within ‘specialist domains’, as discussed above, Kozma (2003) identifies the importance of spoken instruction (in this case in science) in making the links salient between concrete representations and abstract entities. Mortimer and Scott (2003) identify how both authoritative and dialogic communicative approaches can be beneficial in the science classroom: where authoritative refers to presenting just one viewpoint, usually associated with the teacher’s representation of the knowledge domain; and dialogic would involve reviewing different viewpoints, such as the pupils’ contributions, or alternative sources of information. Dialogic in this case would be linked but not confused with interactive communication, as in the latter alternative views may be sought but not ultimately alter an authoritative discourse. Whilst dialogic can be considered in terms of both written and spoken language, in this section we will focus on the use of spoken dialogue in supporting a cumulative and purposeful learning experience.
Mortimer and Scott (2003) propose two dimensions of dialogic-authoritative, and interactive-non-interactive communication, to view ‘how a teacher will work with students to develop ideas in the classroom’ (Scott, 2008, p. 20), resulting in the four approaches of dialogic-interactive, dialogic-non-interactive, authoritative-interactive, authoritative-non-interactive, as shown in Figure 2. Within this frame, teaching can be considered interactive without necessarily being dialogic – pupils make suggestions that are not incorporated in the teacher’s direction – and teaching can be dialogic without necessarily being interactive – the teacher reviews pupils’ contributions from earlier, or suggests alternative views for them to consider. The IWB can also be used and orchestrated within this frame as a means of gathering and suggesting alternative views, such as through writing contributions offered by pupils, or searching the Internet live in class for information to answer unexpected questions and supplement the teacher’s and pupils’ understanding.

Figure 2. Four types of communicative approach (Mortimer & Scott, 2003).

To adopt a truly dialogic and interactive approach, teachers must be confident in their subject knowledge and class management, to answer unexpected questions, and to manage pupils’ fear of risk and error in publicly inviting contributions (Scott, 2008). While Mortimer and Scott (2003) highlight the value of combining the four communicative approaches indicated in Figure 2, using the most appropriate to the task and time, they identify the benefits of the cumulative nature of a dialogic-interactive approach in allowing pupils to explore ideas and integrate new understandings. This emphasises the potential role that spoken language can play in consolidating teaching and learning experiences, and also the role of allowing pupils to add their contributions to the public arena on the IWB. Mortimer and Scott suggest that the use of a dialogic approach is more beneficial for topics that are considered more difficult to grasp, where there is a substantial conceptual leap between everyday and scientific knowledge.

This educational challenge is particularly relevant in the teaching and learning of science, where much learning is of concepts and phenomena that cannot be made tangible, and so have to be represented via concrete analogy or everyday occurrence. For instance a case study by Gillen et al. (2007) identified a teacher’s use of a video clip played on the IWB, of water evaporating from a hot frying pan, as water vapour and evaporation cannot be seen. The large visual screen of the IWB and functionality to play video enables significant aspects of the video representation to be made salient, through replaying the video, making and annotating freeze frames of the key points, and teacher talk to identify the relevance of the everyday phenomenon of using a frying pan to the scientific concept of evaporation. This chain of activity would represent a dialogic-interactive approach to use Mortimer and Scott’s (2003) frame.

Government agency documents also emphasise the crucial nature of language in multimodal teaching and learning but, in contrast to Mercer and Littleton (2007) who argue for the importance of both teachers’ and learners’ language, such documents solely emphasise the language of the teacher: ‘What is critical, however, is the role of the teacher in making explicit links between different modes’ (DCSF, 2007, n.p.). Mercer and Littleton would not deny this, but emphasise also the importance of pupils’ participation in constructing their own use of language.
Thus far, we have focused on the role of the talk and texts produced within multimodal teaching and learning. In the next section we will focus more closely on those doing the talking and text-production.

The role of the actors

The teacher

The influence of sociocultural psychology in the literature about teaching and learning in general, and also more specifically in classroom use of IWBs, is strong. For instance the role of ‘scaffolding’, as introduced by Wood, Bruner, and Ross (1976), is defined by many as a key purpose of the teacher. Within a multimodal teaching and learning environment, this might include developing pupils’ meta-language skills to work with a multimodal array of information. Although scaffolding can be an over-used term in educational discourse (Mercer & Littleton, 2007), it is a useful way of conceptualising how teachers support and extend pupils’ learning. Thinking about this with regard to multimodality, the teacher’s role would be to navigate and guide the interpretation of the complex multimodal array, possibly including material on the IWB, with key points usually drawn out through talk. Teacher talk, in whatever combination of dialogic/authoritative, and interactive or non-interactive, approach, can be viewed as offering a framework to support the ‘reading’ of other modes, toward a cumulative, meaningful understanding of information presented via various modes. This would adopt the view that talk is the central mode, or at least the currently foregrounded mode, used by the teacher to orchestrate and align material in other modes as appropriate to the learning goal.

There is much debate, however, over what level of scaffolding is provided by resources, technological or otherwise, and where multimodality enters into this. The concept of scaffolding generally involves a complementary consideration of ‘fading’ of the scaffold, whereby support is gradually withdrawn or reduced as need lessens. Any scaffold provided by technology such as on an IWB slide, by its nature, cannot be faded (Faux, 2005) unless removed by the teacher, or obscured by a screensaver. To gain the benefits of any facility or resource, learners must know what facilities are available to extend their learning in order to make use of them, and be able to progress to no longer needing this support.

In contrast, some researchers have highlighted how the IWB in particular tends to reinforce a traditional, teacher-centred pedagogy, with the IWB, the teacher, and pupil attention firmly rooted at the front of the class (Hall & Higgins, 2005) – at least in the early phases of IWB use. As mentioned, scholars are divided as to whether teacher talk and class discussion act as a scaffold and mediational device for navigation of other modes, or as a mode equal in importance to all other modes in use. In terms of practice, how teachers conceptualise this relationship is likely to be implicated in their use of talk and other tools and modes. Equally, how the teacher utilises the IWB, and their underlying pedagogy, will determine whether the IWB is portrayed as a tool within the scaffold which they can foreground or fade, a means of gaining and keeping attention, or the scaffold itself for pupils to draw on independently.

In considering both the role of the teacher and the active participation of the pupils, Gillen et al. (2007) explore the way in which a teacher orchestrated the use of video, images and photographs on an IWB to cue common knowledge of shared experience of water evaporating from a hot frying pan. These resources and artefacts also served
as anchors for building new learning – providing a starting point and a means to extend the common knowledge. The IWB itself was employed as a vehicle for working with content: animations, static images and photographs were displayed, annotated, and changes discarded or saved as appropriate. This use of the IWB and images facilitated the teacher in striking a balance between planned structure and spontaneity, in following and guiding the direction of the dialogue around the resources in a variety of modes. Such flexibility is seen as both very important but very difficult for teachers to achieve.

The other key actors in this process are of course the pupils and their role in using IWBs within a multimodal classroom experience, as will now be discussed.

The learners

In terms of pupil participation, a multimodal curriculum involving design and redesign of meaning ‘sees the learner as fully agentive, as becoming fully aware of the potentials, capacities and affordances of the materials to be used in the designs’ (Kress, 2000, p. 141). Where available tools include the IWB, the notion of pupil interaction with learning materials as well as engagement with content comes to the fore. Content to be covered in lessons is largely introduced by the teacher, and we have already discussed the role of the teacher in orchestrating planned and spontaneous lesson material and discussion. In this section we will review how the learner can be involved, through personal and mediated use of various resources and modes, in constructing their own understanding.

As emphasis moves from the creator of a text, usually the teacher, to the receiver, or learner, the role of the ‘interpretive community’ is stressed by Kress and van Leeuwen (2001): ‘we define communication as only having taken place when there has been both articulation and interpretation … communication depends on some “interpretive community”’ (p. 9). The work therefore to be done in co-constructing meaning is in creating a match between intended and interpreted meaning. The participation of the learner is needed in modifying the resource to fit into and extend their understanding. Gillen, Littleton, Twiner, Kleine Staarman, and Mercer (2008) for instance reported a pupil’s manipulation of scientific terms and arrows randomly presented on the IWB, to demonstrate his understanding of the processes and products in the water cycle. Regarding the IWB, learner participation could be direct participation through involvement or interaction with the tool (Warwick, Mercer, Kershner, & Kleine Staarman, 2010), vicarious participation by watching classmates’ physical interactions with the technology, or conceptual and verbal participation by contributing to class discussion around the IWB resource. All of these forms of participation could have been present around Gillen et al.’s (2008) observed use of the IWB as noted above, and are also evident in accounts of older pupils’ IWB use by Hennessy, Deaney, et al. (2007), and Hennessy, Wishart, et al. (2007). Johnson and Kress (2003) identify the importance of human agency in meaning-making, both in conveying and in interpreting communication. This raises the issue of the relationship between meaning-making and knowledge.

The idea that knowledge is constructed rather than something that is pre-made is emphasised by Kress (interviewed in Bearne, 2005), stating that: “‘Knowledge” doesn’t exist other than in its materialization’ (p. 291), and that ‘communication happens only when there is interpretation’ (p. 297). Thus we see that the interpretive community (the learners) are as important as the teacher in communicating and
building new understanding. Kress (2000) summarises this view in claiming that ‘in all communication we work with culturally already shaped material … but in working with these materials constantly reshape them, remake them’ which presents ‘a radically different theory of meaning, of semiosis, in which the individual is always shaping … and never simply “using”’ (p. 142). It is critical therefore to emphasise that the role of the teacher in encouraging pupil participation can be seen through the teacher’s ‘shaping’, or orchestration, of the numerous modes and resources used, including but not limited to the IWB, to support learning of planned objectives and unplanned explorations.

Closing thoughts
Increasing recognition of the pervasiveness of digital technologies, and multimodal texts in children’s out-of-school lives, is highlighting a need to incorporate such resources and practices within teaching and learning, and to understand how to use such tools to enhance current practice and pupils’ building of their own knowledge. Therefore it seems that there is an apparent balance of influences that is driving new and evolving approaches to classroom practices. On the one hand this can be considered in terms of growing access to resources, technological (such as the IWB) and otherwise, through which to mediate teaching and learning activities. Equally, this is combined with a growing sense that there are multiple modes and media through which to explore topics and issues. Research is divided as to the role of language in orchestrating a multimodal learning environment, but the majority agree that the role of the learner is just as critical as that of the teacher in communicating and constructing information and knowledge through a vast array of modes and media.

Implications for practice
This paper has highlighted a number of ways in which the IWB has been orchestrated by teachers and adopted by learners within a multimodal approach to classroom activities and experiences. In a bid by many researchers and teachers to move toward more flexibility of content and activity, we can draw on Haldane’s (2007) reference to the IWB as a ‘stable’ medium, relative to talk as ‘unstable’. In this situation the IWB can be used to capture the ephemerality of class discussion for future revision, leaving the teacher free to move on or return to key points and curricular criteria at the pace of class learning. We can view how these tools can resource construction of temporary and permanent representations of individual and shared knowledge, and aid the development of subject understanding and acquisition of subject discourses (Lemke, 1990). This process can afford continuity between lessons and concepts in a cumulative but not necessarily linear trajectory of knowledge building. Such flexibility is more likely to occur where lesson resources are both created and used in class by the same teacher, and so created with the specific class in mind. This offers a potential comparative advantage to primary teachers, who spend more time than secondary teachers with the same pupil group. In this manner, resources are also more likely to be reworked by learners where the pupils have been the explicit target audience during design. Where the processes of design and use are carried out by different people it is possible that lesson content will appear dictated and thus restricted to following the plan, with little scope for teacher improvisation, such as might be found in the uncritical use of commercial resources.
In introducing any resource and issue, teachers should be mindful of the role they themselves play in communicating an intended meaning, but also the potential for multiple interpreted meanings from their learners. More broadly, teachers wishing to embrace a multimodal curriculum should consider whether they view all modes of communication as equal or certain modes as more dominant, and how this view impacts on the relationships between content displayed and worked with via the different modes and media they use in class. Practitioners may find it useful to reflect on how pupil participation with physical and conceptual content in a variety of modes, including that on the IWB and in class discussion, could help to reveal misunderstandings and support development of shared understandings. This may require greater flexibility of content coverage, modes and media used, and a teacher’s subject knowledge to explore unexpected answers and questions, but could offer the real reward of genuine pupil engagement in learning by pursuing threads initiated by pupils’ expressed understanding, curiosities or queries.

**Implications for research**

This paper has paid attention to how teaching and learning are enacted when addressing classroom practices, rather than simply focusing on the IWB. Within this the IWB is viewed not in its own right but in terms of how it is utilised as one resource amongst many. Through this we have aimed to stress the complexity of connections that need to be acknowledged in viewing the IWB in context.

For instance, researchers should be aware of teachers’ perceptions of the various resources available to them. They should also be mindful of teachers’ and pupils’ experiences and preferences in terms of the multiple, foregrounded and combined modes and media through which they explore topics. How material is presented and used in class may vary greatly and for many reasons. Such an exploration would inform a contextualised consideration of IWB use, alongside other resources in the classroom.

From the research reported here, the potential benefits of synergies between research and practice are evident. It is apparent that good practice in teaching and learning could be fostered and developed by teachers engaging with or in research.

Research should now explore how a multimodal learning environment including an IWB is used to resource a cumulative teaching and learning experience, by considering the introduction, development and re-presentation of concepts through the use of improvable objects, toward an extended view of shared and individual meaning-making trajectories across a series of topic lessons. With some exceptions (notably Hennessy & Deaney, 2005–2007; Littleton et al., 2010) this is a relatively neglected area of research, and is something we will be addressing in our onward work.

**Notes on contributors**

Alison Twiner has worked on a variety of projects investigating the use of various technologies in schools. Currently she is undertaking a doctorate in the Faculty of Education and Language Studies at the Open University. She adopts a sociocultural approach to classroom use of interactive technologies, particularly interactive whiteboards.

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Karen Littleton is professor of Psychology in Education at the Open University. She has a particular interest in the use of language in the classroom. In collaboration with colleagues she has developed a distinctive line of research concerned with understanding how classroom dialogue contributes to children’s intellectual development.

Denise Whitelock is a senior lecturer in Information Technology at the Open University’s Institute of Educational Technology. She is also co-convenor of the Educational Dialogue Research Unit at the Open University and is interested in building electronic feedback systems that support new forms of electronic assessment.

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Technology, Pedagogy and Education


