Preface

In a well-publicized speech in June 2009, the Governor of California outlined plans to replace commercially available textbooks with digital or eBooks. While Governor Schwarzenegger argued that this new policy reflected the importance of the digital revolution in education, namely that today's "digital native" (Prensky, 2001) learners should have new technologies in the classroom as much as in their social lives, his opponents interpreted it as a political stunt to cut much-needed expenditure from California's budget deficit. In this example, as in many others related to educational ICTs, reflection on the importance of developing teachers' awareness of how to use digital technologies is usually an afterthought rather than a structuring principle. Echoing the name of the education policy introduced in 2001 in the United States, "No Child Left Behind" (NCLB), it is equally important in today's digital age, where short-term fixes such as the one described above are often the norm, to underline the need for an education policy that is also aimed at continuing professional development for educators. Such a policy, we recommend, could be called "No Teacher Left Behind" (NTLB).

While the large-scale introduction of eBooks is still some way off, the interactive whiteboard has been perhaps the most significant learning technology to have received widespread attention and financial support over the last decade. This book is one of the first collections of research-based papers to consider the integration of interactive whiteboards in educational institutions around the world and includes chapters focusing on England, Wales, Germany, Canada, Brazil, the United States and Ireland. As such it responds to the increasing availability and recognition of digital technologies in the educational sphere (Beetham & Sharpe, 2007), while also emphasizing the importance of professional development, credible educational research and a dialogue between teachers, administrators, policymakers and learners to guide and inform the process of technology integration in education.

Typically fixed to a wall or mounted on a portable stand, interactive whiteboards provide a touch-sensitive digital display connected to a computer and data projector. The surface of the board can be written on with a special pen or finger and software applications from the attached computer can be displayed and manipulated by teachers and learners, either at the board or remotely with the aid of wireless devices such as voting pods or slates. The "interactivity" indicated by the name has given rise to two vastly different interpretations. Advocates suggest that the board establishes increased collaboration between teachers and learners underpinned by constructivist pedagogy. Detractors on the other hand, see the centrality of the board at the front of classrooms as re-establishing a transmission-based approach. This difference of perspective reinforces the point made by many of the contributors in this book, namely that it is teachers who are responsible for pedagogy rather than technologies.

Since the late 1990s the UK government has made substantial funding available for educational institutions across the age spectrum to improve their ICT infrastructure. It has also made ICT competence a necessary element in granting Qualified Teacher Status (QTS). One of the most visible signs of ICT

funding in the UK has been the presence of interactive whiteboards in primary and secondary school classrooms, as well as to a far lesser extent in further and higher education, where they are mostly used in teacher training. Totaling approximately £330 million, the UK government's investment in ICT between 2002 and 2005 resulted in approximately 80% of primary schools having four or more IWBs, while 90% of secondary schools have almost 11 on average (Becta, 2006). Following the British lead, President Vincente Fox made a declaration to provide 145,000 IWBs and data projectors to state primary and secondary schools in Mexico in 2005. By 2006, the British Council had purchased approximately 350 IWBs for use in its English language teaching centers around the world (Wightman, 2006, p. 10). In addition to the UK and South America, numerous other national and international projects involving IWB technologies have emerged during this period, particularly in South Africa, China, the Middle East, Australia, and to a lesser extent, North America.

One characteristic many of the early IWB projects in the UK had in common was that the introduction of the technology preceded substantive research. Putting technology before pedagogy is not of course a new development, as anyone familiar with the history of educational technology from radio, through educational television to the microcomputer knows (Cuban, 2001). Interactive whiteboards have once again proven that far from being a solution to real pedagogical problems, educational ICTs have become a political football, promoted by a range of commercial and government interests, with teachers and learners left with the task of figuring out what to do with them long after they have been installed. One of the major problems with the "install first and understand later" philosophy is precisely the question of professional development, and that is why it is a major concern in this book.

Advocates of the technology have positioned IWBs in the history of learning technologies as the latest in a long line of devices aimed at transforming pedagogy. Swept along by their discourse of "transformation" and interactive whiteboard "magic" (Betcher & Lee, 2009), they have at times obscured any modest influence the technology has had or may have in the future. Critics, on the other hand, interpret IWBs as the latest example of an "oversold and underused" technology (Cuban, 2001), which does little to improve interactivity or enhance learning (Dudeney, 2006). These critics see it as an elitist tool that does more to widen the digital divide than close it. In this guise, IWBs reflect little more than the short term posturing of national governments that want to see an instant transformation in education without addressing the underlying problems of their own educational systems, such as large class sizes or meaningful professional development for teachers.

The integration of IWBs can also be situated in a much wider context, when we understand that the growing presence of ICTs in education over the last two decades has been the result of an increasing awareness by national and international policymakers of the need to prepare students for 21st century literacy skills (Lankshear & Knobel, 2007; Solomon & Schrum, 2007). Today's students and educators are living in the "information revolution" (Lankshear & Knobel, 2007) or "network society" (Castells, 2000) reflecting the transition to a globalized economy facilitated by digital technologies. The term ICT incorporates two aspects of the changing worldview associated with the network society. One is easy access to or an increasing overabundance of information. The second is the emphasis on communication. The investment by governments in digital technologies reflects the growing realization that students' ICT literacy skills have to develop in order for national economies to remain competitive in an increasingly interconnected world. Where once such a rationale was clear for more vocational disciplines and training purposes (mathematics and science), now it is equally applicable to a range of subjects in the humanities, including for example, language education, where IWBs have received a great deal of interest (Cutrim Schmid, 2007, 2008).

Since the early part of the twentieth century, numerous reasons have been advanced to establish a rationale to introduce new technologies into the classroom, many of which have been influential in relation to IWBs to date. Cuban's (1986) historical study of the classroom use of technology since 1920 in the United States identified a recurrent logic of "constancy and change" driving the process. Through this "fickle romance" between educators and technology, as he refers to it (Cuban, 1986, p. 4), educational institutions have also aligned themselves with the discourses of "social efficiency" and "social mobility" to provide a "rationale for [supporting] economic competitiveness" (Cuban, 2001, p. 10). The race to provide the latest technologies in the classroom goes well beyond the needs of "tech-savvy" teachers and reflects the importance of government policymaking and the prevailing market philosophy. A coalition of technology advocates, drawn from commercial providers of equipment to policymakers, to those seeking to bridge the digital divide of access, as well as classroom "missioners" (see Chapter 1, this volume), are driven by the "belief that if technology were introduced to the classroom, it would be used; and if it were used, it would transform schooling" (Cuban, 2001, p. 13). Davis and Karpatri (2005) have summarized these discourses, which have been active in shaping the reception of educational ICTs in general and IWBs in particular:

1. *ICT is strongly related to socio-economic competitiveness*. ICT promotes literacy skills essential for the 21st century and therefore has major implications for curriculum development in education.
2. *The use of ICT to enhance educational outcomes*. Research is often undertaken *after* the introduction of the ICT rather than before in a way which would have shaped its direction. While many studies exist, findings are mixed, and often unreliable in terms of more widely applicable conclusions.
3. *ICT can be used to improve access to education*. It can be used to provide access to educational materials and opportunities which would normally be denied to people with a range of physical, mental or learning difficulties.
4. *ICT is a driver of change*. It can be used to produce or initiate innovative changes in education and society.

During the initial stages of IWB integration in the UK context, they were seen as symbols of the transition to the global economy; they were considered essential to communicate with a new generation of learners; the technology was often aimed at technology schools in disadvantaged areas to address issues of social and technology equity in education; and they promised a new style of innovative classroom learning. Based on these framing discourses, and seen from the perspective of this book, it is possible to identify three stages in the reception of IWBs in the UK, a chronology that may be beneficial for educators from other countries to understand, as the technology becomes more international.

In its educational reforms, the New Labour government emphasized the need to increase the amount of whole class interaction, particularly in relation to young children with the aim of improving standards of attainment. In order to reach this aim, the National Literacy Strategy (NLS) was launched in 1998 and the National Numeracy Strategy (NNS) followed in 1999. Smith et al. (2004) and Kennewell and Morgan (2004) draw attention to the fact that a conflict was created between this drive for higher levels of attainment in literacy and numeracy and a more general focus on the development both of ICT skills and of greater autonomy in learning.

In the initial stages of integration as the technology emerged, there was a focus on small-scale case studies examining pupils' and teachers' perceptions, mostly conducted by practitioners whose predisposition was typically strongly in favor of the technology. Most of the research on the educational use

of IWB technology in this phase was done in primary schools, as this was the context in which IWBs emerged (Burden 2002; Kennewell & Morgan, 2004; English et al., 2002; Burns & Myhill, 2004).

From approximately 2003 onwards a new phase can be dated in which reports funded by government agencies were published, and the focus shifted to the analysis of classroom use and more importantly the implications for pedagogical practice (Becta, 2003, 2004, 2006). During this stage the relationship between whole class teaching and higher levels of interactivity was widely questioned (English et al., 2002; Burns & Myhill, 2004; Smith et al., 2004; Hargreaves, 2003). Smith et al. (2004) for instance, pointed out that there was a lack of empirical evidence showing that whole class teaching was more interactive in the sense of promoting quality dialogue and discussion. Therefore, several authors (Smith et al., 2004; Hargreaves, 2003) set out to investigate patterns of whole class interaction in the literacy and numeracy lessons in order to find out if these lessons are genuinely "interactive". They argued that, although teachers have been obliged to use interactive whole class teaching, very little information on its meaning and almost no training programs on how to implement it have been provided for teachers.

Latterly, these research reports gave rise to the first wave of academic publications that culminated in the special edition on IWBs in the journal *Learning, Media and Technology* in 2007 edited by Kennewell and Higgins. This book continues this recent engagement with the subject, agreeing with Rudd (2007) who argues, it is now time to move the debate away from questions about whether IWBs are inherently "good" or "bad" technologies, and to engage with more appropriate questions concerned with "the optimum conditions for effective use; the factors that may support such use; the aspects that may influence future developments; as well as the types of evidence needed that will enable us to implement appropriate changes" (p. 1).

In addressing these issues, research on the use of IWBs during the third stage of reception still presents a mixed picture. On the one hand, it seems to support the technology's potential to improve and extend learning practices; provide better clarification and display facilities; model difficult concepts; increase attention spans and improve student focus; encourage greater tactile connection between learners and the learning environment; and develop "theatrical tension" by captivating learners (Kennewell & Beauchamp, 2007; Smith et al., 2005; Moss et al., 2007). Alternatively, other studies indicate that IWBs can be used to impede student control and reinforce the centrality of the teacher (e.g. Gray et al, 2007; Cutrim Schmid, 2008). Furthermore, the mere introduction of the technology does not guarantee an enhanced learning environment. The presence of IWBs can represent opportunities for teachers to use information in more effective ways, primarily in terms of organization and management, however this does not automatically suggest that the learning environment for students will be enhanced. The role of the teacher, his or her knowledge of the technology and how to use it, will be the most important factors in determining if successful progress can be identified and supported.

In the context of these differing viewpoints, Moss et al.'s (2007) assertion that, "the introduction of an IWB does not in and of itself transform existing pedagogies" (p. 5), is a warning that perhaps ought to be stamped on all new learning technologies rather like a government health warning. Such a more modest approach would emphasize the role of learning technologies like IWBs as tools to be used by teachers rather than vice versa and would not overemphasize their inherent "transformative" potential.

The integration of interactive whiteboards in classrooms around the world over the last decade provides a fascinating case study of the current state of pedagogy and increasingly interventionist role adopted by governments in directing education policies and national curricula. Unlike the previous books on interactive whiteboards which deal primarily with technical issues (Barber et al., 2007; Braham, 2006; Gage, 2004) or provide overly enthusiastic and uncritical accounts of the technology characterized by a

missionary zeal (Betcher & Lee, 2009), this book attempts to consolidate the attempts to move discussion on the subject to a new stage. By including chapters from many of the most prominent researchers on the subject of IWBs to date, we hope that the book will make a contribution to the debate about the importance of research-based studies in the field of educational policy making in general and learning technologies in particular. Although much of the book deals with the UK provenance of IWBs, it is clear that over the last five years the technology has become increasingly international. The book should also be of value then to educators around the world who are looking for a context to understand where they are and where IWB technology can take them in the future.

AN OVERVIEW OF THE CHAPTERS

The book is divided into two main sections, "Theory and Research" and "Practice", each consisting of two parts. Part 1 - Mapping the Field, focuses on an overview of existing research in the field and begins with a detailed and wide-ranging literature review (Miller & Glover, Chapter 1). This focus is developed via a discussion of what can be learned from policy issues related to the early integration of IWBs in UK schools (Moss & Jewitt, Chapter 2), and the identification of a series of organizing discourses of "transformation, orchestration and participation" which mediated the integration process (Twiner, Chapter 3). Finally, a fascinating overview of the field of digital publishing is provided in Chapter 4 (Russell), which highlights the increasing importance of the role of teachers as writers of digital materials.

Part 2 - Classroom Research, consists of six chapters each examining influential research-based studies on classroom learning environments in the compulsory sector from leading IWB researchers. This section of the book responds to the need for research that investigates the impact of IWB on pedagogical practice and learning outcomes. Furthermore, many of the chapters provide detailed descriptions and analyses of lessons in which interactive whiteboards were used, and have a clear reference to the rationale underlying the pedagogical activities. Gray (Chapter 5) discusses the danger of IWB technology being used to support teacher-centered approaches to language teaching, while providing insights into the political and policy forces that helped shape the use of the technology in the English educational system. Higgins (Chapter 6) adds an interesting discussion on the challenges faced by research that investigates the impact of technology use on learning outcomes. The chapter points out, for instance, that although the findings obtained in the second year of the study indicated that the overall impact of technology use on standards was negligible, "it may also be that the introduction of the technology was beneficial for learning, but the indicators used to assess outcomes did not capture the changes that resulted". Hennessy et al. (Chapter 7) identified several pedagogical strategies that have been used by science teachers to harness the functionality of IWBs. Miller and Glover (Chapter 8) analysed changed pedagogy among maths teachers, highlighting the trajectory of IWBs from a presentational and motivational support tool to one which provides the basis for more effective conceptual and cognitive learning by students. Their findings are especially useful for informing teacher training in the area of mathematics teaching. Swan et al. (Chapter 9) investigated the impact of IWB use on learning outcomes in school-based research in the United States. In their conclusion, they highlight the importance of identifying indicators to assess the impact of technology on learning, an issue that needs to be discussed more thoroughly in the literature in the future. Bannister et al. (Chapter 10) provides the only full-length chapter focusing on the use of learner response systems (LRS) in connection with IWBs. Drawing on literature on LRS in education

and data collected in a UK school to develop a model of teacher development, the authors answer some important questions about how LRS should and could be used in learning contexts.

The first part (Part 3) of Section 2 - Professional Development, considers the importance of developing training programs for teachers involved in the integration and development of IWBs. All authors in this section highlight the importance of investment in teacher training and professional development as a key element for supporting the integration of IWB into the curriculum in a way that enhances learning. All three chapters discuss the analytical frameworks for the evaluation of teachers' use of IWB technology and models of training and professional development. They emphasize the importance of a) the provision of continuous technological and pedagogical support and b) the establishment of communities of practice (or small group collaboration) in helping teachers to further their professional development in this area. A detailed model of pedagogical change is outlined by Cogill (Chapter 11), while Haldane (Chapter 12) articulates strategies for the process of professional development called Transformative Personal Development (TPD). Cutrim Schmid and Schimmack (Chapter 13) consider the concrete aspects of a model of IWB technology training for language teachers that may have more widespread appeal to teachers from all disciplines.

Part 4 - Teacher Perspectives, contains four chapters reporting on a series of international case studies and research projects from teacher practitioners. Since the introduction of the IWB in schools numerous action research projects have been conducted by teachers and many communities of practice have been created. While our collection provides only a few examples of these numerous projects, we would like to underline their importance and value to research in the area. In Chapter 14 Bettsworth focuses on the use of IWB in the Modern Foreign Languages classroom with a case study based on students' use of the technology at Lancaster Girls' School in the UK. Lim-Fong and Robins (Chapter 15) provide an insightful account of the "bottom up" integration of IWBs in Canadian schools where teachers took the initiative to develop a framework for teacher support and development using new technologies. Soares (Chapter 16) analyzes the use of IWBs to support the implementation of podcasting projects in language schools in Brazil. Judge (Chapter 17) discusses the first large-scale project to incorporate IWBs in schools in Ireland, describing how teacher-led initiatives that receive no government funding can be successful. Finally, in the Afterword to the collection, Stephen Bax reflects on the possible futures of IWBs by elaborating on his influential discussion of normalization in CALL (Bax, 2003) and considering new hybrid forms of the technology.

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