Afterword

Magic Wand or Museum Piece?
The Future of the Interactive Whiteboard in Education

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ABSTRACT

This chapter looks at the processes by which a technology such as the interactive whiteboard can become “normalized” in our practice, in other words how it can reach the stage when it is used seamlessly and almost invisibly in our everyday pedagogy. After briefly reviewing the literature on the concept of normalization, and the ways in which a technology can reach that stage, the chapter argues that the IWB is not yet fully normalized in education, but the indications are that it might be some way through the process. It then draws on the work of the other contributors to the volume as a whole in order to identify some of the key factors which might contribute to the normalization of the IWB. It concludes with some recommendations for research and development for those seeking the normalization of the IWB in future.

The key to making the IWB work for you is to take tried and tested teaching strategies and resources as your starting point, then wave that whiteboard wand over them to transform them into dynamic and interactive resources. (Evans et al., 2009, p.188; my emphasis)

If we are to believe the above quotation, the interactive whiteboard is magical in its transformative capabilities, its sorcery requiring a minimum of human effort in order to impact on learning. This magical power has also been witnessed by others. According to McLean in The Guardian newspaper, the IWB is a worker of miracles, “not only allowing young students access to the curriculum but also simultaneously teaching them the English language” (McLean, 2006, p.7; my emphasis). Teachers, in this formulation, will be redundant very soon. The IWB will simply do our teaching for us while we lie on the nearest beach.
Or will it? In sharp contrast with those who see the IWB as an educational magical wand, others are starkly negative. Dudeney (2006, p. 10), while attracted to some of the IWB’s features in language education, considers that it will never play a significant role in most language classes, partly because it is “an elite tool, or an impossible goal for the great majority”. Equally doubtful, Thornbury transforms the IWB acronym in order to damn it as an “Interactive White Elephant” (2007), implying likewise that it is doomed to failure, to end up as a dusty museum piece. Many classroom teachers are also skeptical, as exemplified by this quotation from a teacher’s blog:

*I am not … a big fan of interactive whiteboards and remain to be convinced of their importance to teaching and learning. I believe interactive whiteboards are only so popular in schools because they tend to reinforce traditional teacher led modes of learning. The teacher in front of a class leading the lesson with a visual aid is what we have been doing since schooling began. Teacher active - pupils passive …

*I can see mileage in using a large visual display at the beginnings and ends of lessons to briefly introduce or consolidate the learning and also for fostering open ended discussion of pictorial sources. But can’t this be done much more cheaply and just as effectively with an internet ready laptop and a digital projector?

*Why spend oodles of money on an expensive board which offers perhaps at best a presentation tool, a reveal tool and a quiz builder? (Walker, 2006)

So as we conclude this volume and look to the future it is timely to pose the questions: will the IWB be an educational magic wand, or will it instead end up as an expensive museum piece? Who is likely to be proven right in this debate? In what ways can the contributions to this volume shed light on the possible future impact of IWB technology on education?

**ORGANIZATION OF THIS CHAPTER**

Since it is impossible at the moment to predict the future of the IWB with any certainty I cite the opposing viewpoints above not so much to decide between them as to illustrate the wider point which this chapter seeks to make, namely that the ways in which such debates over technology are commonly presented reflects a polarized and rather blinkered understanding of how technological innovations operate in society in general and in education in particular. To put it another way, as we seek to understand the possible future role of the IWB in education I propose that we need to adopt a perspective on technological innovation in education which is rather more complex and nuanced, and to my mind more satisfactory as a model of how technologies operate in life and in education, than the models which implicitly underpin the polarized viewpoints exemplified above.

One of my aims in approaching the debate in this way is to help us to move towards a more robust and accurate understanding of how technologies such as the IWB actually operate and can potentially operate in education. I will start by looking at sociotechnical innovation in the broadest sense, alluding briefly to what we know so far about how we interact with new technologies, and then in the later stages of the chapter I will consider how this might help us to understand the particular case of the IWB. In that later section I am fortunate in being able to draw on the many varied and insightful chapters in this volume as a whole, in order to reflect on how the IWB might perhaps impact on education in the years to come.

**NORMALIZATION REVISITED**

The background to my approach derives from arguments I advanced some years ago concerning what I termed the “normalization” of technology
(Bax, 2003), by which I meant the stage when a technology, be it an everyday one such as a watch or a fork, or a pedagogical one such as a textbook or a pen, can become after time relatively invisible in our daily use, so seamlessly is it employed in our everyday practice. This stage of relative “invisibility” or normalization is when – I argued – a technology is at its most useful, having gone through various intermediate stages when it is not yet normalized, including what I termed the excessive “awe” stage, when it is felt to be perfect for every possible use (as in the McLean quotation above), or the excessive “fear” stage when the technology is felt to be somehow dangerous or at best useless (as in those quotations above which condemn the IWB out of hand). Having perhaps passed through these and other stages, a technology can then sometimes reach the normalization stage, when it has found its proper place and therefore become relatively invisible and most useful.

To express this in more formal terms, the underlying hypothesis relating to the concept of normalization can be set out as follows:

A technology has reached its fullest possible effectiveness when it has arrived at the stage of “normalization”, namely when it is invisible, used automatically and without our being consciously aware of its role.

Since my original article in 2003 (and also Chambers & Bax, 2007; Bax, 2008) this concept of normalization has been cited and addressed in a variety of discussions concerning the role of technology in education (e.g. Jung, 2005; Levy & Stockwell, 2006; Hansson, 2008; Allford & Pachler, 2007; Lamy & Hampel, 2007; Spencer-Oatey, 2007; Davies, Walker, Rendall & Hewer, 2009). The concept is seen by those who cite it as potentially useful for teachers seeking a better understanding of their relationship with technologies. For example it has been seen as useful for language teachers:

> we believe that working towards normalization is a useful, practical strategy. Language teachers are very much working within a complex system of opportunity and constraint. Normalization then becomes a process of understanding the infrastructure, the support networks, and the materials, and working effectively within them. (Levy & Stockwell, 2006, p. 234)

Other writers apply the concept to related technologies such as interactive whiteboards themselves (Cutrim Schmid, 2008), distance learning and autonomy (O’Dowd, 2007), and even to more general analysis of methodologies and pedagogies (Farmer, 2006).

To my mind the concept of normalization can prove useful also in our discussion on the possible future place of the IWB in education since it allows us to frame a number of salient questions, such as: to what extent is the IWB currently “normalized” in education? If it is not currently normalized, could the IWB in future attain full normalization in education, in its current form or in some modified form? How, if we choose to do so, might we speed up the process of normalization?

We will return later to consider these and other issues relating to the possible normalization of the IWB in education, but first it is important to understand in further detail what normalization entails and how a technology can reach that stage.

**TOWARDS NORMALIZATION**

I have suggested elsewhere (Bax, 2003, 2007, in preparation) that the progress towards normalization, in very general terms, can be characterized broadly in diagrammatic form as in Figure 1.

We take the end point of normalization, at the right of the diagram, to be the stage when we use the technology without considering it even to be a technology, when it is invisible. We
use it without our being consciously aware of its value to us, as when we put our spectacles on our nose in the morning or our shoes on our feet. The diagram aims to illustrate in broad terms some of the stages which a technology typically goes through before reaching that normalization stage. Research on the impact of innovations in general (Rogers, 1995; Bax, 2003; Chambers & Bax, 2006) suggests that we can characterize some typical stages as follows.

**Early Adopters**

A few users adopt the technology out of curiosity or obsession. Most of us are not “early adopters”, or else we are not early adopters with every technology, but a few people will obsessively buy any new technology which arrives on the market. Such users are rather pejoratively treated as “geeks” or “anoraks” but they serve a crucial function as trendsetters, and also in effect fund future development of the technologies in question. In terms of the diagram in Figure 1, they often act as the “trigger” for the average user, as indicated on the left of the diagram. We see someone with a new gadget and this triggers our own interest.

**Try Once**

People try it out but reject it because of early problems. They cannot see its value. They are skeptical or uncertain. Frequently, after the first flush of enthusiasm, our interest dips. We try the gadget once but we are not convinced. The new technology does not seem to add anything of “relative advantage” (Rogers, 1995) to our lives or work.

**Fear**

At this point we are often excessively nervous of the technology and its possible impact on our cozy patterns of activity. With many innovations scare stories begin to circulate which cause users to be nervous. When microwave ovens were introduced there were rumors that they could spread cancer (“Don’t be fooled by the scare stories”, 2009). With mobile phones there have been constant rumors of brain damage or testicular cancer. Concerning the search engine Google, it was recently alleged in a daily newspaper that “[t]he digital age is destroying us by ruining our ability to concentrate” (Appleyard, 2008, n.p.). In the diagram this is indicated by the dip in confidence, the uncertainty of the new.

**Try Again**

Sometimes such fears can kill off a new technology completely, but often we see others using the new technology and we gradually start to believe that...
it can indeed help us in one way or other, either in practical ways or else simply to help us to fit in with the fashion or the crowd. We try it again. We see its “relative advantage” for ourselves (Rogers, 1995).

Awe

In the normalizing process we also frequently encounter a stage of high enthusiasm, even passion, the stage at which we start to have exaggerated expectations of what the technology can do for us. It will change our lives. If it is educational technology, it will allow us, as teachers, to spend more time relaxing while our students are soaking up education on their own from the IWB.

Normalizing and Normalization

Gradually we realize (perhaps subconsciously) that we were excessive in our fear and no less excessive in our awe, and at this point the technology starts to take a more normal place in our work or daily activity. We start to see it as a natural part of our lives or activity, not the centre of what we do, but a useful tool, in its place, alongside other useful tools. It comes to be seen as something normal. The technology is so integrated into our lives that it becomes invisible – “normalized”.

This informal characterization of a typical process should not lead us to assume that normalization always happens, nor that it always happens in this order or in these ways, but I suggest that this is a useful general characterization of a process which successful technologies and innovations of various kinds frequently go through. I have described it here in fairly straightforward, unsophisticated terms, so it is now appropriate to look in greater depth at the theoretical background to the concept itself and processes involved in normalization, and then to see how this can help us to understand where the IWB might figure in education in future.

A THEORETICAL FRAMEWORK FOR NORMALISATION: SOCIOTECHNICAL CHANGE

The danger of a diagrammatic representation such as that in Figure 1 is that it might be taken to imply a straightforward and linear movement towards normalization of a kind which rarely occurs in practice. It is important to bear in mind, then, that although a technology might go through some or all of the stages identified above, it might go through them in a different order, it might omit some of them, and or it might never reach normalization. Furthermore, although this diagram represents some stages by which a technology might achieve normalization, a second danger of such a representation is that it might also oversimplify the reasons why a technology might succeed in normalizing. As we now turn to consider the factors which underlie sociotechnical innovation in general, it is therefore important to treat the process of normalization as highly complex, involving a potentially wide variety of factors.

We have already hinted, in the characterization above, at some of the reasons why a technology such as the IWB might catch on and become normalized in education. We noted the role of “early adopters”, the point about “relative advantage” (meaning that we will only use a new technology if it adds something significant to what we do already), the role of fashion, and so on. This alerts us immediately to the fact that the reasons why a new technology becomes normalized can be many and varied; as I said, it is therefore important to avoid reductionism in our attempt at explanation, but unfortunately many writers do not do so. For example, many popular debates, when conceptualizing the broad relationship between technology and society in such simplistic terms, typically base their analyses on variants of what I have termed the “single agent” or “sole agent” fallacy (Bax, 2003). It is often supposed, for example, that single inventors “cause” technological change by themselves, or that particular
inventions are in themselves the main agents of change (Bijker, 1997). Of course in a few cases single inventors have had unusual impacts, or particular inventions have caused change in themselves, but for the most part sociotechnical change or normalization is far more complex than these formulations imply, and results from numerous interconnected factors working together in subtle and often intricate ways, rather than from any single factor or agent (Pacey, 1983).

This is to call for a more complex conception of sociotechnical change than is commonplace in popular and even some academic debates, a conception which perforce sees technological change as resulting from an intricate interplay of social, historical, economic and political forces, rather than from any one or two causes in isolation. In arguing for a more complex view of the relationship between technology and society I align myself with Bijker's broadly constructivist approach (Bijker, 1997), which in turn fits with what Mercer and Fisher (1997) have called a “neo-Vygotskian” perspective as a means of understanding the place of technology in education, with its emphasis on the social and cultural as opposed to the merely technical.

As I have argued more recently (Bax, in preparation) seeing normalization in these terms requires us to take into account a range of wider social and cultural forces which might bear on the individual user of a technology. It requires us to conceive of the teacher using the IWB, for example, not as operating in a vacuum, deciding by his or her own volition whether or not to use the IWB for the next lesson, but as a social actor enveloped in and profoundly influenced by a mesh of wider cultural and human forces. This broad sociocultural perspective is consonant also with Pacey’s work which emphasizes the need to examine “technology practice”, which includes the sociocultural dimension, as opposed to simply the “technical” dimensions (Pacey 1983). It is also consonant with research into other aspects of technology in education, typified by positions such as this:

*a sociocultural approach to online research encourages educators to look at technology, not as an independent force that shapes and determines how learners carry out a learning task, but rather as a part of a complex mesh of factors which go to making up any particular learning context.*

(O’Dowd 2007, pp. 32-3; my emphasis)

When considering the future of the IWB in education, then, my discussion will draw on this broadly social constructivist perspective which in effect stands against simplistic “single agent” explanations of sociotechnical change. In this regard Bijker makes the important point that:

*[a] central adage for this research is that one should never take the meaning of a technical artifact or technological system as residing in the technology itself. Instead, one must study how technologies are shaped and acquire their meanings in the heterogeneity of social interactions.*

(Bijker, 1997, p. 6)

This is another way of saying that it is a mistake to attribute sociotechnical change to any signal agent, such as “the technology itself”, since to do so would be to fall into the “single agent” fallacy. Bijker then goes on to describe the debate between what he calls “internalists” as opposed to “contextualists”. The first group of theorists tend, in Bijker’s view, to believe that “we can understand the development of a technology only if we start with an understanding of the technology in all its minute details” (Bijker, 1997, p. 10). Here too I align myself with Bijker on the opposite side of the debate, as a contextualist, supporting the contrary view that:

*the economic, social, political, and scientific context of a technology is as important to its develop-
ment as are its technical design characteristics. (Bijker, 1997, p. 10)

For our debate concerning the IWB, therefore, this warns us against suggesting that the mere attributes of the IWB in themselves will be the main or sole factors in the technology’s eventual success or failure. Furthermore, it will be clear from this that I see dangers in any approach which seeks to explain sociotechnical change in terms of a sole agent, be that sole agent the technology itself or its creator, or anything else in isolation. Such views are in my view dangerously simplistic, since they run the risk of ignoring other factors which can potentially be of significance. To reinforce the point, Bijker in his analysis (1997) offers detailed discussion of three technologies as a means of showing just how complex and multifaceted the factors behind sociotechnical change can be, namely the bicycle, bakelite and the electric bulb, and demonstrates through close analysis of their histories the complexity of their progress towards normalization (as I would call it) and the wide range of social, economic and other factors involved in that process. This can act as a warning, so that when we consider how technologies such as the IWB can become normalized in education we must do so from a perspective which allows us to take account of as wide a range of social and other factors as possible, not focusing too narrowly on the features of IWBs in themselves, or on any other single aspects of the technology or its use.

To put this another way, when we ask ourselves how a technology such as the IWB can become normalized, it is advisable to seek to answer that question in terms of a broad range of factors as opposed to a narrower set. This derives from the awareness that, historically, as Pacey (1983), pointed out some time ago, sociotechnical change always comes about as the result of a number of interconnected factors, social and cultural as well as technical, and this in turn is to set the debate on normalization within a resolutely social constructivist neo-Vygotskian “contextualist” framework.

The consequence of this is that we should wherever possible eschew simplistic explanatory statements or predictions. These include those which we quoted at the start of this chapter, which might suggest simplistically that the IWB, for example, or any other technology, will fail simply because it is too expensive, or too elitist. We must equally be suspicious of the opposing view, that the IWB will succeed simply because it is “interactive” or “easy to use”. To offer such views is, I suggest, to fall too easily into the simplistic “single agent” mode of thinking. It is important that we should go beyond this if we are to understand fully how any technology such as the IWB can operate in education, and how it might or might not have a useful future impact on learning.

This general view of normalization as a process which results from a complex interplay of factors, social and other, was already part of my original formulation of the concept (Bax, 2003), but drawing now on discussions such as Bijker’s, as well on the wider literature on sociotechnical change seen in its social and cultural context, including the work of those authors cited above, we can now begin to appreciate in even greater detail how a proper understanding of normalization and its processes can help us to understand where the IWB might be going in future.

**WHAT DOES THIS MEAN FOR THE IWB?**

We are therefore now in a position to review the ways in which the other contributors in this volume have assisted us in understanding the possible normalization of the IWB, but before doing so it may be helpful to summarize my arguments so far. I have suggested that when we consider a technology such as the IWB and how it might become normalized in our lives or in our educational work, we can expect to see it following a
typical path perhaps starting with skepticism on the part of users, then moving to excessive fear mingled with exaggerated awe at its possibilities, and then perhaps settling into a pattern of use which is natural and relatively invisible or normalized. That was the thrust of the diagram in Figure 1 and the discussion which followed. I then argued for the importance of seeing the interplay of forces leading to normalization as a complex and intricate one, as a process occurring within a complexity of social and cultural forces, which means we should resist the lure of any more reductionist approaches which might tend to oversimplify how and why technologies succeed or fail. I stressed the importance of avoiding the “sole agent” fallacy, which is so common in discussions of technology, and the importance of taking a broader and nuanced view which includes a wide range of social and cultural factors in our analysis.

THE IWB AND NORMALISATION

Is the IWB normalized in education at the moment? Normalization operates differently and at different rates in different contexts, of course, so at any one moment a technology such as the IWB might be normalized in one school or in one organization or in one country but not in another. However, the very fact that we have in front of us a volume on the IWB in education, meaning that sufficient numbers of stakeholders from around the world see a need and a value in such a volume, suggests in itself that the IWB is not yet typically normalized in many areas of education, and that this volume has a part to play in that process. A number of contributors in earlier chapters have pointed to an element of skepticism and doubt among users, typical of an early stage in a normalization process. In Chapter 2, for example, Moss and Jewitt note that recent large-scale research into the effectiveness of the IWB has been cautious about the resulting educational benefits, noting that “uptake has not necessarily changed teaching in the ways that were anticipated”. Others too have cited skepticism from various quarters.

By contrast, awe and passion are also evident: although no-one in this volume has been unwise enough to characterize the IWB as a magic wand, almost all have highlighted the value of the IWB in various educational domains. Bettsworth (Chapter 15) reports on “unanimous” enthusiasm among pupils in her study. Hennessy, Deaney and Tooley (Chapter 7) report on the “meteoric rise” in the popularity of the IWB; Higgins (Chapter 6) cites teachers and students as being “overwhelmingly positive” about the IWB. In short, the general thrust of the volume is that this technology does have a potentially positive role to play in education. However, the fact that this needs to be said at all indicates that normalization of the IWB is not yet the norm. It suggests again that in terms of the diagram in Figure 1, we are probably in the middle of it, some of us skeptics and doubters, others in the throes of passion, and others still undecided.

WHAT MIGHT HELP THE NORMALIZATION OF THE IWB IN EDUCATION?

From this point of time onwards, there is of course no guarantee that the IWB will in fact ever become normalized in many or even most educational settings. That will depend on a host of factors including the economic, social, political, and scientific dimensions which I referred to above. This volume does, however, offer us many useful insights into some of the key elements which might assist the process of the normalization of the IWB, so as we try to look into the future of this technology it is useful to review some of the factors which contributors to the volume have considered to be most significant.
Pedagogy and the Teacher

In this regard it is noteworthy, from the outset, that many chapters in this volume focus on pedagogy, on the teacher and on teacher training. Early in the volume, Gray in Chapter 5 makes use of a set of examples to illustrate the ways in which teachers can “meet their own immediate concerns in the situated reality of their classrooms”. Hennessy, Deane and Tooley examine pedagogy in a science context in Chapter 7, while Miller and Glover in Chapter 8 focus on maths pedagogy. Swan, Kratcoski, Schenker and van ‘t Hooft in Chapter 9 explore in some detail teachers’ practice, looking at how teachers’ use of the IWB can impact on students’ reading, language arts and mathematics. These discussions of pedagogy and the teacher are continued in Chapter 11 when Cogill focuses usefully on “teacher’s whiteboard pedagogical practice”, and unpacks some of the aspects of that knowledge as central factors which underlie teachers’ practice. Teacher development is a focus of Chapter 12, where Haldane considers “Transformative Personal Development” (TPD) as a means of improving IWB use. Still in the area of pedagogy, but this time discussing training, Czutrim Schmid and Schimmack in Chapter 13 note that “the lack of high quality teacher training is a major factor impeding the integration of new technologies in education”.

This focus on pedagogy and the teacher is then further emphasized in Part IV which looks at teacher perspectives. Lim-Fong and Robins, for example, in their fascinating discussion in Chapter 14 of the Livingstone Inquiry Group, focus on how teachers “came to understand the significant potential of these IWBs to enhance lessons within their immediate educational environment”.

This strong focus on pedagogy and the teacher, evident throughout the volume, fits well in fact with Miller and Glover’s comprehensive survey of the literature on IWB use in Chapter 1, in which they chart the use of the IWB since its introduction into UK schools, and note the central role of the teacher in the possible normalization of the IWB: “the IWB will only be of lasting significance in enhancing student attainment if teachers are prepared to change their teaching approaches into a more interactive mode”.

This is surely true. Pedagogy, the teacher, and therefore teacher development and training are of course crucial, given the obvious centrality of the teacher in most educational settings, so the amount of attention devoted to teachers, to pedagogy and to teacher training and development in the chapters and case studies in this volume reflect the importance of this dimension. However, it would be a mistake to assume from this that the IWB will simply reach normalization if we pay all or most of our attention to the teacher. We need to recognize that the teacher is but one agent in the process, and furthermore that the teacher is an actor on a wider social stage - indeed contributions by the writers cited above and by others in the volume repeatedly make it clear that if we wish for the normalization of the IWB it would be an error to devote our attention exclusively to teachers’ attitudes, practice and training.

Pupils

For one thing, that would be to ignore the pupils. One need only read Bettsworth’s vivid account of pupils using the IWB in what I consider a normalized way, almost oblivious of their teacher, to see the huge role that pupils’ attitudes and practices play and will play in the normalization process:

Two pupils came up to the IWB to drag the steps into the correct sequence. What was striking was the total concentration from the rest of the class, and this was the case in both teaching groups. Pupils raised their hands when they disagreed with the decisions being made by the two pupils at the IWB. The two pupils did not ask for help from their peers, but instead they looked to see how many hands were raised, and then revised their previous decision, with only minimal discus-
Afterword

sion between the two of them. The focus and silent response of all pupils was remarkable.

One general point to be drawn from this is that no matter how far the IWB is normalized in the teacher’s practice, it will only be effective if and when it is normalized in the learner’s practice also. Just as teachers need to adapt their attitudes and practices to a new technology, learners do too, and we ignore this fact at our peril.

Administration, Policy and Power

Another important factor in normalization is the attitude of the school as a whole, and of the wider school system, and in particular the attitude of those in power. At times technologies can be imposed in educational settings in a top-down manner in a flush of enthusiasm, but without the appropriate planning and understanding of the ecology of the setting (Tudor, 2001, 2003), in ways doomed to failure. In Chapter 10 Bannister, Hutchinson and Sargeant, discussing learner response systems, give an illuminating description of just how this can operate:

There are examples of the equipment being bought by the headteacher after a commercial demonstration at a conference or trade show. In essence, this can mean that the headteacher has never observed the technology in use in the classroom environment. Equally, this then means that the school has not developed any strategy for implementation and the equipment arrives in school without any forward planning.

The assumption underlying this headteacher’s action appears to be that simply buying the equipment will be enough to make it effective, thereby once again falling into the “single agent” trap and ignoring the host of pedagogical, social, human and other factors which normalization requires. By contrast, supportive and enlightened management can make a genuine difference. The same authors found from their study that:

the implementation of the equipment is more successful when a senior leader within the school is involved. This is because there is more potential for a strategy to be developed for the long term aims and goals of using the equipment.

This again serves to make the wider point that it is not the teacher alone, nor even the teacher and the pupils, who will necessarily be the sole or main determining factor as to whether a technology is normalized in education, since the attitude and behavior of those “higher up the chain” can also be crucial. However, I would go further, and argue that if we are to understand how the IWB or any other technology is to become normalized in education or in wider society, we need also to consider the role of larger social and cultural forces, far beyond the school walls, as they impact on users. Teachers, pupils and headteachers do not exist in a vacuum but are subject to wider societal attitudes, forces and pressures just like anyone else. A crucial factor here of course can be aspects of government policy; Moss and Jewitt in Chapter 2 make the key point that those in power are frequently too hasty in their approach to implementation, and often have too ambitious expectations about quick returns on investment.

This dimension is alluded to by several of the other authors in this volume, among them Gray and Higgins, who demonstrate the way in which educational factors (such as the National Literacy and Numeracy strategies in the UK, and the emphasis on whole class teaching) can operate with political forces and indeed with economic strategies in the process of sociotechnical change, but Higgins’ finding that despite much investment and planning “the impact in terms of students’ attainment on national tests was very small and short-lived” must surely give all policy makers pause for thought, and cause us furthermore to agree with Moss and Jewitt that those in power need, amongst other things, to identify more “modest objectives”, and perhaps more besides.
CONCLUSION: WHERE NEXT?

The central thrust of this chapter has been that, since research into innovation and sociotechnical change in general shows the crucial importance of taking into account a wide range of factors, including social, cultural, political, economic and psychological matters, we will only be able to predict the future of the IWB in education with any success if we insist on adopting such broader perspectives in our analysis and discussion. The other authors in this volume have shed important light on some of the central factors involved in the possible normalization of the IWB, including the pedagogy, teacher, teacher development, pupils’ attitudes and behaviors, the role of management and policy and others, some of which I have alluded to above. However, in order for us to obtain a fully rounded picture of how the IWB might become normalized in future, I suggest that our next step could be to address four further issues in our research and practice, here framed as four questions:

Are we Planning Appropriately for Sociotechnical Change as Regards the IWB?

Numerous of the previous chapters, for example Moss and Jewitt, have suggested that policy makers and planners have not always planned and prepared appropriately for the use of the IWB in education, and many of those planners seem to have adopted narrow “single agency” approach, as I noted above. Higgins proposes in the light of his comprehensive study that: “embedding new or developing technologies in education needs a pedagogical design phase as well as a technological one”.

This implies, rightly in my view, that too frequently those who plan for the use of the IWB have tended to focus too narrowly on the technology, and do not take sufficient account of the full range of issues involved in normalization. These include the pedagogical areas which Higgins mentions, but in my view policy makers also frequently neglect many other relevant social and cultural issues of crucial importance in normalization. In short, planners and policy makers, if they are to plan for a normalized IWB in education, need to have a far greater awareness of how the processes of sociotechnical change operate and of the complexity and long-term nature of the process, and they then need to tailor their promises, strategies and investments accordingly.

Are We Taking a Too Optimistic and Too Short-Term View of the Impact of the IWB?

Several contributors to this volume cite examples of excessive optimism in the use of the IWB, and an exaggerated expectation of immediate or speedy impact or change. History shows, however, that the normalization of a major technology is frequently a long, slow and unpredictable process, so we need to expect and plan with medium- and longer-term vision, as well as with caution. I would echo Gray’s suggestion, for example, that a longitudinal study of teachers’ use of the IWB would be beneficial, since a shorter term study is unlikely to tell us much about genuine sustained impact. In this regard the extensive research described in Higgins’ chapter is also salutary, since it warns us not to expect massive impacts all at once. We need constantly to remember that the process of normalization is a long series of small steps rather than a giant leap, and to be prepared for that.

Have We Taken Full Account of all the Social and Cultural Factors which Bear on the Possible Normalization of the IWB?

In my view the profession has so far neglected to consider some of the social and cultural dimensions of IWB use, without which our picture is
incomplete. Tudor (2001, 2003) has warned against taking a too “technical” view of educational change, and argued instead for a more “ecological” approach, and in light of this I would propose the need for more qualitative and ethnographic research into the particular contexts of use of the IWB around the world. The chapter offered in this volume by Lim-Fong and Roberts gives a rich insight into the daily lives of teachers, for instance, and I suggest we need more studies of this kind to flesh out the details of the particular social and cultural factors which impact on the normalization of the IWB. We recall Bijker’s emphasis on “the economic, social, political, and scientific context of a technology” (Bijker, 1997, p.10) and on the fact that “technologies are shaped and acquire their meanings in the heterogeneity of social interactions” (Bijker, 1997, p. 6; my emphasis). We might also consider in greater depth the emotional and affective dimensions (McCarthy & Wright, 2004) of our and our pupils’ use of the IWB. This is to argue for a more sustained analysis of the local and the particular, including the relatively neglected pupils, their perceptions and modes of use, and to call for a program of research, probably in ethnographic mode, into the ways in which different cultural groups in different socio-economic environments make use of the IWB, so as to allow us to see (as we cannot currently see) to what extent success or failure depends on these factors.

**Could the IWB Evolve into Something Else?**

In our calmer moments none of us would claim, of course, that the IWB is a magic wand. Perhaps one day decades hence we will indeed walk through a dim museum corridor and glimpse a lonely IWB gathering dust alongside the record player and video machine. However, I suggest that it is unlikely that the whole of IWB technology will now simply disappear; it is far more likely that it will evolve, perhaps converging with other technologies by taking on functions previously reserved for separate different devices (cf. Jenkins, 2006).

The teacher whose blog we quoted at the start of this chapter wondered why the functions of the IWB could not be carried out more cheaply with “an internet ready laptop and a digital projector” (Walker, 2006), but we might equally anticipate that the IWB could eventually combine all the functions of a laptop, a traditional whiteboard and more besides. We might also expect, with Higgins (Chapter 6), that “[t]he stage after this is perhaps the development of multi-user, multi-touch environments” which aligns with Bettsworth’s call for more “individualized interactions” (Chapter 15).

Given Bannister, Hutchinson and Sargeant’s chapter on learner response systems (Chapter 10), it is therefore surely possible that the IWB might combine with such interactive systems to provide a technology which is even more interactive and individualized than anything currently available, perhaps a “hybrid IWB” or something with a new name altogether. And so long as such a device succeeds in putting the learner and learning first, and therefore putting itself in the background, I suggest that it might well succeed in eventually becoming the norm in our classrooms, as normal and as normalized in the education of the future as the pen and pencil are today.

**REFERENCES**


