



GUIDELINES FOR EFFECTIVE SCHOOL/CLASSROOM USE OF INTERACTIVE WHITEBOARDS

The EuSCRIBE Project

MAY 2010



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With thanks from the EuSCRIBE Project Team

Diana Bannister MBE - Project Director

Andrew Hutchinson - Learning Technologies Adviser

“The whiteboard is not a magic carpet. It will not float into your classroom and whisk your troubles away. It is more like investing in a new house, certain things are in place when you agree to the purchase, not all of it is organised as you would like, but with the careful gathering of the things you need, and a few new installations, it soon begins to feel familiar. However, it will need continued love, investment and maintenance to ensure that it remains adequate to be your C21st home.”

Diana Bannister

FOREWORD

Welcome,

At every level, in every European country, educationalists are working at different stages with interactive whiteboards (IWB). To some, interactive whiteboards are the next best provision to improve learning and teaching, whilst to others, this technology is a long-standing under-used resource.

Regardless of your stage of adoption, it is time to take responsibility for how we can move forward to effective use and application of the interactive whiteboard. The mere introduction of this technology will not revolutionise the classroom; it is dependent upon addressing strategic management issues at all levels.

Capturing the picture of the European use of IWB in 12 weeks is perhaps a challenge that most would agree to with some hesitations. However, this project has been uplifting and energising because we have had the opportunity to work with practitioners who are keen to embrace interactive technologies and willing to learn. The experience of users provides evidence of a vast pool of knowledge and it is the insight of practitioners that we have tried to evidence within this report in order to determine how others can make progress.

Whether you are a practitioner, adviser or commercial supplier, this report can help you to review your use of this technology and consider what steps can be taken to ensure that the implementation is a smooth and replicable process, recognising that this is only the beginning of integrating the technology.

It has not been our intention to evidence learning outcomes, nor to determine whether or not alternative technologies would achieve similar objectives. However, we would hope that this document enables you to collate evidence to support your work and to determine your pathway for integrating and extending your use of the IWB within learning and teaching.

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CHAPTER ONE: INTRODUCTION

The aim of this research was to develop guidelines for the use of IWB on behalf of European Schoolnet. Across Europe, practitioners are working at different stages with IWB. Some have had their own IWB in their classroom for years, whilst for others, this is an embryonic idea which has yet to be realised.

In 2009 the European Schoolnet formed an Interactive Whiteboard Working Group to begin to address the use of this technology.¹ Thirteen of the thirty-one ministries supporting European Schoolnet are currently part of this group, each with their own strategies and aims for achieving C21st teaching and learning. It is one of four EUN working groups established to develop an annual work programme that is in line with the priorities defined by the supporting Ministries.

The UK itself has the largest investment in IWB technology and Becta have now reported that the average primary school has 18 whiteboards and the secondary school has 38. This means most primary schools have one in each classroom, whilst most secondary schools have more than one per subject department. The Harnessing Technology Survey 2009 said IWB is still the most dominant technology. This does not necessarily equate with effective use.

The challenge remains to ensure that the whiteboards are not just the latest technology installed, but to train practitioners to make effective use and application within learning and teaching. This is a continual and ongoing process.

STRUCTURE OF THIS REPORT

In this report, we offer a review of literature specifically on the use of IWB, focussing mainly on studies from across the UK over the past decade. The purpose of the literature review is to demonstrate the pace of change with the access to IWB technology, but also to outline that many of the priorities raised by researchers and practitioners within the last ten years still remain at the forefront of thinking today.

Within chapter three, there is an overview of the methodology adopted to collect the evidence for this report. The researchers determined some of the key themes from a survey which was distributed to all thirteen ministries. Beyond this, most of the details are based on evidence from four link research visits. This has included visits to schools in Ireland, Italy, Portugal and the UK where the researchers were able to undertake lesson observations and interviews with teachers in each country. Alongside this, three of the countries had focus meetings which allowed for further consideration of some of the key themes.

The observation form that was used within this project has been made available within the appendix of the report.

¹ <http://moe.eun.org/web/iwbworkinggroup/iwb>

The project director also met with four IWB commercial suppliers to discuss the key themes and to understand more about their views and approaches across Europe. Each of these companies had already provided presentations on their respective strategies to ministries in the IWB Working Group in April and May 2009.

This project is relatively small scale, but the guidelines that have been developed can hopefully be used by the classroom practitioner, adviser, the academic researcher and the commercial supplier to understand how to implement and question existing practice with IWB. Many of the questions that shaped this research have been used at the beginning of each of the key areas within the guidelines. This report is not intended to provide all the answers to these questions and it is almost certain that some of those reading will be able to offer additional experience or examples.

KEY QUESTIONS FOR THIS RESEARCH:

1. What are the key areas of focus for schools implementing the use of IWB?
2. What do schools need to do to ensure the effective use and application of this technology?
3. What can commercial suppliers do to improve the use of IWB?

The snapshot of evidence from this project allows the project team to draw some conclusions and gives some indications for possible future research. As one of the commercial suppliers stated: "We have tried to move ministries and schools on in their thinking - to make the transition towards an interactive classroom, ultimately, this means that schools have to define what success looks like."

Evidence suggests that it is now paramount that roles and responsibilities are defined at every level to demonstrate that key decision makers need to be able to embrace opportunities for technology, yet be realistic. Ministries, regional advisers and schools should define their roadmap for improving learning and teaching in partnership and collaboration. Success cannot be achieved in isolation. The ultimate pathway should meet the learning needs of all pupils and maximise the potential of the technology for all practitioners.

WHAT IS AN INTERACTIVE WHITEBOARD? (IWB)

WHAT IS AN INTERACTIVE WHITEBOARD?

An interactive whiteboard (IWB) is an interactive display system that is commonly used in educational settings. The IWB forms a link between a teaching surface and a digital projector and computer. The 'teaching surface' is most frequently a large wall mounted panel that allows the user to operate the computer via interacting with the projected image. Historically, IWBs could only be used by a single user at any one time. Recent technical innovations now allow for multiple users to interact with the IWB on some products.

WHAT TYPES OF IWB ARE AVAILABLE?

There are variations of the basic IWB setup and these are largely classified as fixed and mobile solutions. The user is able to 'interact' with the surface via an electronic stylus (pen) or by using a finger (on touch sensitive IWBs only). There are however, other specifications that may differ between classrooms. For instance, some interactive whiteboards contain an integral processor and can be operated without a computer; many have a built-in boom-mounted, short throw, projector that projects from above the teacher at an angle onto the interactive screen and other IWBs can be moved up and down manually or electrically depending on the height of the pupils. Most IWBs now also include a system of speakers and sound amplification. Older IWBs may rely on the speaker system from the laptop or PC that is attached to it in order to playback sounds from DVDs, video and audio files or from individual pieces of software. IWB can be purchased in a variety of sizes. Smaller interactive whiteboards may be similar in size to a large plasma television (40-50 inch / 101-127 cm) with larger models being available up to approximately (95 inch / 241cm).

It should also be recognised that mobile interactive systems are available to schools that allow the conversion of traditional dry wipe boards into interactive learning spaces via the attachment of electronic sensors to the surface. These systems also supply electronic pens and peripherals and allow interaction with the projected image.

There are several interactive devices available which can provide a complete interactive solution for some schools, but they can also be used to complement the IWB. These include small wireless interactive tablets that allow remote access to the board from anywhere in the room and voting systems or Learner Response Systems (LRS) that allow students to respond individually to a question set by the teacher via their own wireless handset. The responses are displayed on the IWB and can include numerical and text formats as well as traditional multiple choice responses. Users can also invest in a visualiser or document camera that allows the teacher to project a still or live video image onto the IWB screen, annotating or taking screenshots as necessary.

Whatever the technical solution, these technologies allow digital lesson materials to be accessed by the teacher and students within lessons and possess many similar tools and shared characteristics. There are, however, significant differences in functionality and design and an accomplished user of one brand of authoring software might not be able to instantly convert to using a different brand without some technical and pedagogical training.

It is paramount that the Ministries of Education, regional authorities and schools are clear about the type of technology that is required before the procurement specification is released to the commercial suppliers.

WHAT TYPE OF SOFTWARE IS USED ON AN IWB?

All manufacturers provide a software solution that is specifically designed to work with their technology and most can work with other interactive technologies too. This software is provided during purchase and can be downloaded from their websites and user communities or installed from CD / DVD. These applications provide a vast array of tools and content that can be used as part of teaching and learning and that foster interactivity. Tools common to most platforms include pens, highlighters, shape constructors, timers, screen-shades and image capture devices.

Alongside the tools available, manufacturers also provide teaching content and electronic classroom materials. These commonly consist of a range of backgrounds such as squared paper for use in mathematics or manuscript paper for use in music lessons, a wide range of educational clipart, interactive objects such as electronic protractors or stopwatches, educational games and multimedia samples. Most of the interactive whiteboard software that is available on the market allows users to annotate over the desktop. This allows the teacher to use the full range of IWB tools in conjunction with other commercially available products.

Publishers now author their own IWB curriculum materials that contain interactive lesson materials and activities. Sometimes these relate directly to specific brands of IWB but many work across all platforms. There are websites that contain educational content that has been produced with the IWB in mind; teachers simply repurpose existing web content and use it on the IWB screen rather than on multiple netbooks, laptops or computers.

Commercial suppliers, national and regional projects, as well as schools are at various stages of development with creating online user communities and groups. This means users can actively seek to share and swap lesson materials they have created. There are currently negotiations towards developing a common file format for different interactive whiteboard brands. Presently, some formats will allow users to import and convert files from other types of IWB, but this is not typical of all brands.

WHAT IS THE INTERACTIVE WHITEBOARD FILE FORMAT?

As more and more case studies emerge, the issue of interoperability continues to grow. Practitioners want to be able to access materials from a variety of websites or learning environments and do not want to feel restricted by the file format. Commercial suppliers currently operate their own file formats for interactive whiteboard software; for example, teachers become familiar with saving 'flipchart', 'notebook' or 'workspace' files. (e.g. *.flipchart; *.gwb; *.inc or *.notebook) However, in 2007, Becta UK began to investigate the possibility of creating a common file format to allow practitioners to use material on an interactive whiteboard regardless of how it had been created. An initial investigation helped to determine a set of common functionalities. It is important to note that this is for consideration at the point of delivery, rather than preparation of materials. Some advanced practitioners may feel that specific functionality is lost. Users of IWBs will also continue to have the option of using existing authoring software.

At the time of writing this report, Becta state that the development of the specification is complete. There has to be a commitment to adopt the format and it is anticipated that the suppliers will do this in the near future. The ultimate aim is to create a file format which works seamlessly regardless of the type of interactive whiteboard in use. This will be a recognised industry standard and this will mean that publishers and practitioners can create materials in a single format. It will also mean that existing resources can be imported and exported to operate within this new file format.

Frequently Asked Questions on the common file format

How will I recognise the file format?

The file format will be recognised as *.iwb

How do I get materials in *.iwb?

It will require the practitioner or IWB user to have the latest version of IWB software available for use.

Will it work on Windows and Mac?

Yes, it should be able to work across these systems completely.

Can I use the software across the school?

Yes, you can use the software across the school; you may want to make the board viewer available on the school VLE.

What about copyright of materials?

Further detailed consideration is still being given by Becta to issues in relation to copyright.

Additional information will be available direct from Becta's website.

www.becta.org.uk

GENERAL IWB USES

VIEWING AND INTERACTING WITH THE INTERNET WEB PAGES

Many users first begin to use the interactive whiteboard by interacting with the projected image. New users often prefer to use websites that they are already familiar with through their professional duties as a means of developing confidence with the technology. In these instances the practitioner only has to concentrate on using their stylus (pen) or finger correctly instead of a mouse. They will also develop a good understanding of where to stand so as to be able to interact with the IWB efficiently whilst facing the audience. As teachers develop confidence in using the IWB, they may quickly move on to involving students in interacting with games and activities found within the websites. Many teachers quickly build up a bank of websites that work well with their subject speciality and the IWB. Many activities found on educational websites are also now designed specifically with the IWB in mind.

VIEWING AND INTERACTING WITH SOFTWARE

Practitioners can use the IWB to use and interact with specific software within their teaching. As with displaying websites, the key skill is replacing the use of a mouse with a stylus or finger to interact with the software. Beginners may already be proficient users of presentation software on a PC. When giving a presentation, IWB users may begin to work with other tools from within PowerPoint such as the highlighter and pen tools. This allows them to annotate on top of their presentation and for the presentation to become more 'interactive'. Again, practitioners who are repurposing an existing presentation may use this type of activity in order to build confidence during the early stages of use. Other practitioners may use curriculum related software with which they already have some familiarity. For example, a digital audio editor and recording application can be used for creating podcasts. A teacher may use the IWB as a means of teaching key skills to the whole group in using the software or for sharing the completed podcasts at the end of a lesson.

NOTE TAKING USING INTERACTIVE WHITEBOARD SOFTWARE

Interactive Whiteboard manufacturers provide users with specially designed IWB software. This software allows users to write notes on electronic pages throughout a lesson. The software allows for changes to the size and colour of the pen and includes access to other generic tools such as shape creators and line tools. A page turner will allow the addition of new, fresh pages similar to a traditional paper based freestanding flipchart. Lesson notes and drawings can be saved at the end of a lesson and more advanced users may use tools such as handwriting and shape recognition in order to make script clearer. Advanced software includes the facility to recognise text as different languages. Notes saved at the end can be reopened at the beginning of a new lesson in order to revisit learning or to provide students who were absent with a record of what has already happened.

VIEWING AND INTERACTING WITH A DVD OR VIDEO CLIP

Most computers attached to an IWB will have an integral DVD drive and player as well as a media player. New users often find playing DVDs and media clips a simple and effective early use. The practitioner can easily pause clips and lead class discussion around the theme of the clip or a particular segment. IWB software also allows for screen shots to be taken that allows the teacher to storyboard sequences. Annotation of clips, using the IWB pen or highlighter tool, is also a simple, but effective, technique.

Streamed broadband clips are commonly used in educational settings. Websites such as <http://www.bbc.co.uk/learningzone/clips/> offer a wide array of educational video content that can be streamed through the IWB and shared with a whole group. Commercial providers also provide clip banks and additional IWB resources for purchase by individual schools and school districts.

ANNOTATING THIRD PARTY SOFTWARE, WEBSITES AND IMAGES USING DESKTOP TOOLS

Interactive Whiteboard software often includes a set of desktop tools that can be activated and used in conjunction with websites and third party software. These applications will initially allow the teacher to write and draw over other software. With confidence, the user may begin to access other tools such as screen shades, timers, cameras and onscreen keyboards which can help make the use of the third party software more dynamic and interactive.

CREATING AND TEACHING A LESSON WITH INTERACTIVE WHITEBOARD SOFTWARE

Interactive whiteboard software allows the user to create and adapt pages in advance of the lesson. The software is specifically designed to allow the authoring of lesson material by the teacher and there are many tools that are generic to all brands. These include text, shape, highlighter, pen, spotlight, screen capture, magnifier and fill tools. The software provides a resource gallery of clipart, learning objects, videos and sounds, pages and backgrounds. It allows screen objects to be layered, grouped and duplicated. Hyperlinks can be created to embed video clips, documents and web pages in most brands. The authoring software provides the more experienced IWB user with the opportunity to design and create interactive learning activities that both the teacher and pupil can use during a lesson. User communities are now established for some manufacturers that provide additional resources and banks of lessons that may be downloaded and adapted by users. Online training and tutorials can support the development of practitioners' use of the IWB. This training is often accredited and may be at additional cost to the user. Guidance from expert teachers and face-to-face training sessions are also common strategies used by school districts, individual schools and manufacturers in order to support the development of practice using the technology.

COMMONLY USED IWB TOOLS, TECHNIQUES AND APPLICATIONS

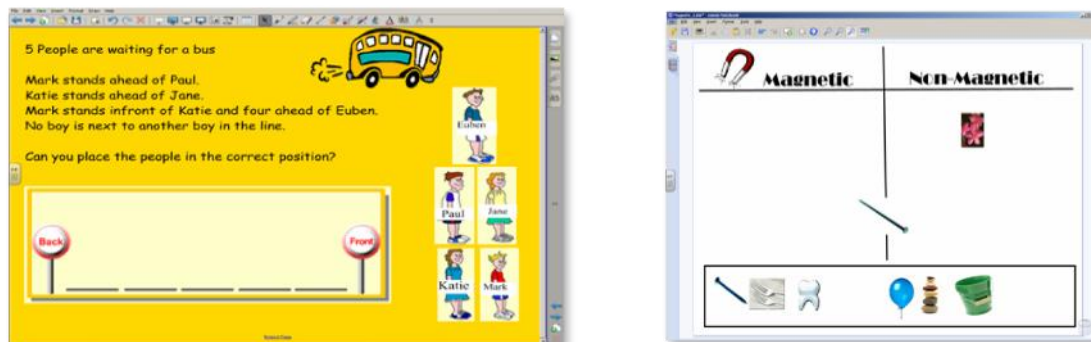
PEN TOOLS / HIGHLIGHTERS

All interactive whiteboard software allows the user to write within the IWB software and on top of the desktop. As a first step, users often learn to vary the colours they use to make specific teaching points or use the highlighter tool to annotate text and images. Other common applications are labelling diagrams and simple note-taking on a blank page. The pen tools allow the size, colour and properties of pen lines to be changed in order to suit the needs of the activity. Some IWB software allows the pen line properties to be changed so that they begin and end with arrows in order that they can be used for matching activities. More advanced users may use thicker pens to paint over words and images on the screen in order to hide them from view. In most IWB software there is a digital eraser tool that is used to remove writing from the screen.



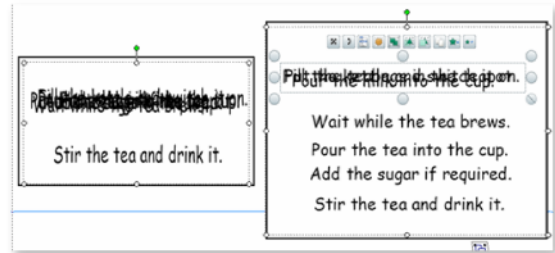
DRAG AND DROP / MATCHING

The simplest action to undertake on an IWB is to drag and drop objects, moving them around the screen. Many interactive activities are based on this simple idea. In example one the pupils place the characters in the bus queue depending on the clues in the problem. In the second example, materials are classified by dragging them to the correct column.



TEXT TOOLS

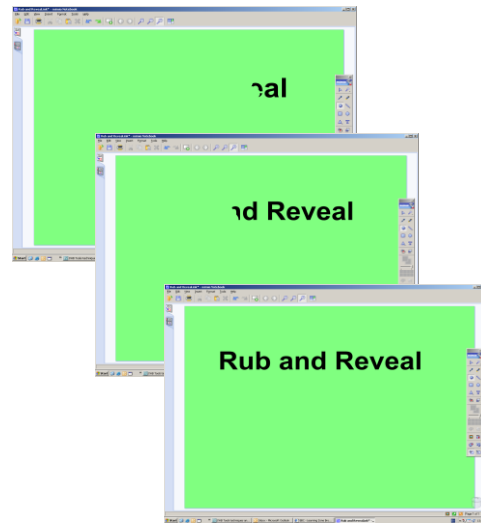
Text tools allow text boxes to be added to the screen. This can be for individual words or longer pieces of text. They include all of the normal tools from a word processor that allow for different font styles and sizes. In the example, several text boxes have been stacked up so that the pupils cannot read the words. The second screenshot shows pupils removing sentences and deciding on the correct sequence.



RUB AND REVEAL

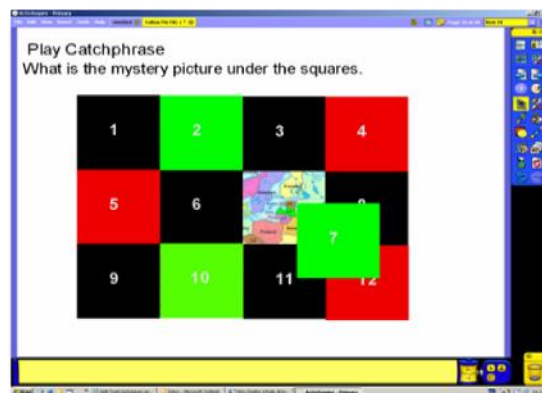
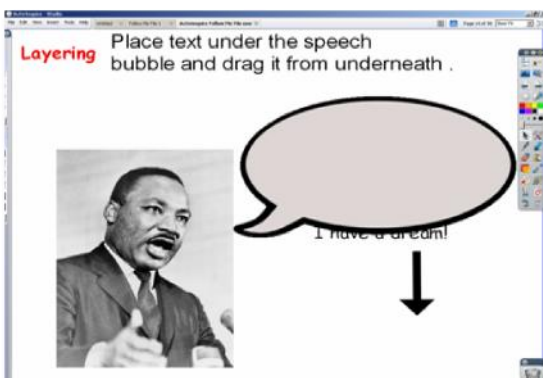
Rub and reveal is a commonly used technique with most interactive whiteboard software. The user hides an object such as text or a picture under a layer of ink. In some instances the ink is the same colour as the page background on others it contrasts. The user simply uses the eraser tool to rub away the layer of ink to reveal the word or image beneath it at an appropriate moment during the lesson.

Text is covered with a layer of green ink then gradually rubbed away to fully reveal it.



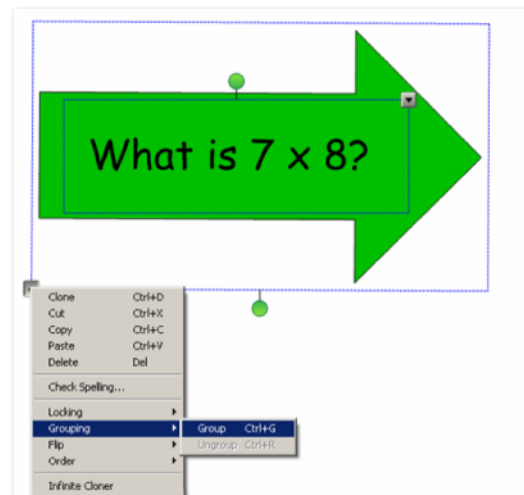
LAYERING

Layering allows the IWB user to place screen objects in a desired order on the screen. Users may use this concept in a number of ways to create tasks. Example 1 shows some text hidden underneath a speech bubble. The speech bubble is locked down and the user can pull a quote from underneath the speech bubble at any time during the lesson. In example 2, the pupil removes the coloured tiles to gradually reveal the mystery picture beneath.



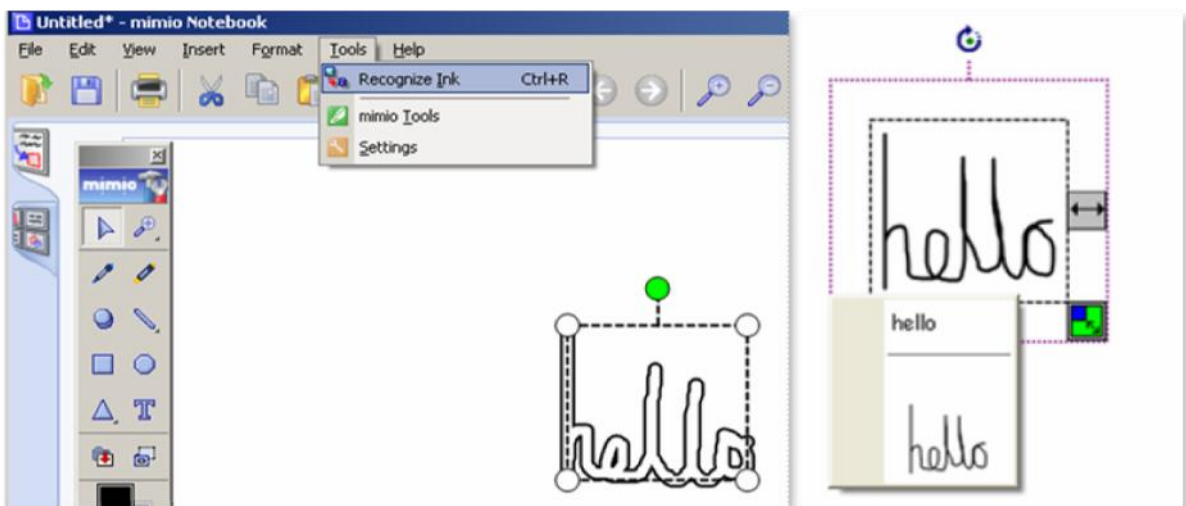
GROUPING

Grouping allows the IWB user to combine more than one image or text object in order to make a composite image. This can be useful when creating labels or matching activities. In the example, an arrow and a key question have been grouped. The arrow is placed partially off screen and dragged onto screen using the finger or stylus at the appropriate moment during the lesson.



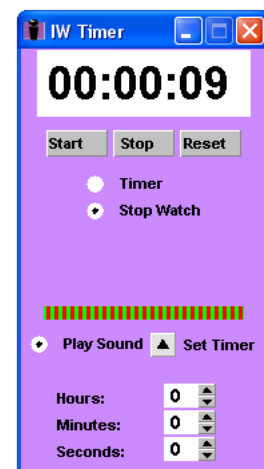
TEXT / HANDWRITING RECOGNITION

Most interactive whiteboard software allows the user to write with the pen tool and then turn it automatically into text. Often the software will offer a number of text alternatives in order to take into account different styles of handwriting. Some brands will convert handwriting into a specific target language. e.g. a teacher in France converting handwriting into German in a foreign language class.



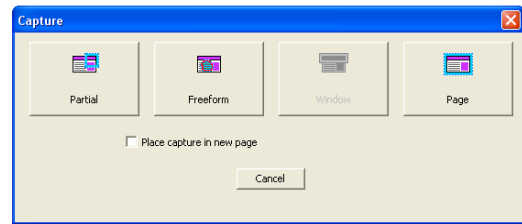
TIMERS / STOPWATCHES AND CLOCKS

Countdown clocks and timers are commonly used by teachers as part of normal teaching. Timers found within the IWB software allow the teacher to manage the length of lesson segments and can be programmed to play a sound or tune to signify the end of an activity.



SCREEN CAPTURE / CLIPPING / CAMERA

This tool allows the user to cut parts of an image either from within the IWB software or from an external source. The image can either be square or rectangular or freehand. During this research project teachers were observed using this tool to cut out a character from an image taken from a video clip. Other uses might include capturing diagrams from websites or creating a jigsaw from an image.



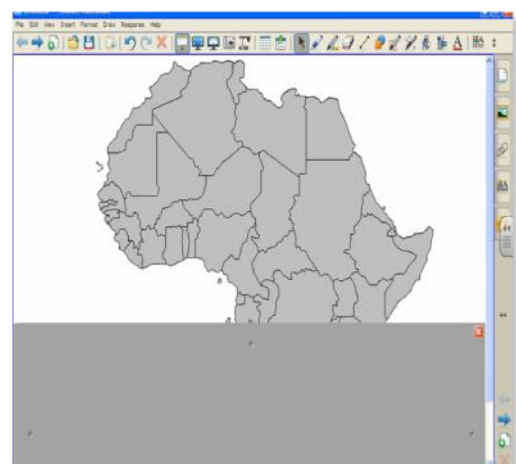
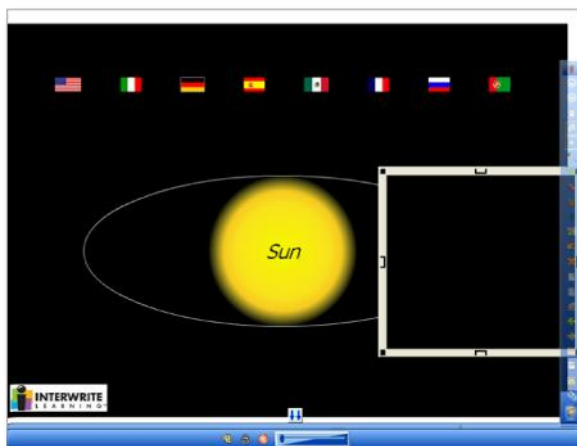
SPOTLIGHT / SEARCHLIGHT

The spotlight or searchlight tool allows the teacher or student to explore individual parts or aspects of the screen. The user can make the area within the searchlight larger or smaller and may also change its shape so that the searchlight area is square or rectangular. This tool is often used to explore images or texts and can also be used in conjunction with other software and websites.



SCREEN-SHADE, BLIND, CURTAIN OR REVEALER TOOL

This tool is a simple screen cover that is used by teachers to hide all or part of the screen. Commonly it is used to gradually introduce teaching points or an activity. It functions in a similar way to a 'Roller Blind' but can also be pulled horizontally. In the first screen shot it is being used to cover part of the screen where the Planet Earth would be. In screen shot two it is drawn down to gradually reveal a map.



ANIMATION

Objects on screen can be animated in a number of ways. The simplest approach is to create a page and duplicate it many times. The user simply moves objects slightly on each page in sequence similar to an animator's flipbook. As the user turns the pages, the objects move or change. This is particularly useful if explaining processes or cycles. A second commonly used animation technique is that of programming screen objects in order for them to move, disappear or change when clicked on by the user when at the IWB. For instance, the image of a door may be programmed to flip one hundred and eighty degrees. This might reveal who is behind the door. Finally, screen objects might be programmed to move around the screen, similar to traditional presentation software. More complex animation is possible by importing and embedding Macromedia Flash objects or movie clips that the user has sourced elsewhere or written themselves.

SCREEN OR PAGE RECORDER / VIDEO CAMERA

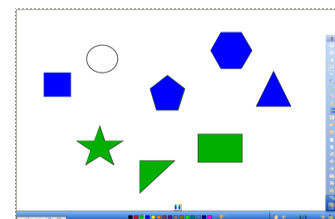
This tool can be used to record all activity that takes place on the interactive whiteboard during a session. It can apply to the full screen or a particular area. The resulting video clip can be saved in multiple formats and viewed using most media players. Some practitioners will use this tool to record the answer to a problem before a lesson or to record a process then replay it during the lesson to reinforce learning.



FILL TOOLS AND TECHNIQUES

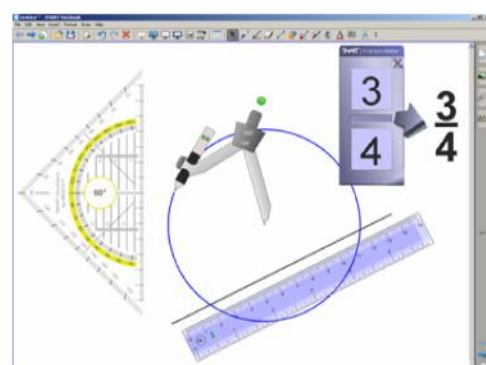
The fill tool allows users to change the colour of a shape, text object or the background by clicking on it and selecting a colour. In the example the fill tool has been used to fill the regular shapes in blue and the irregular shapes in green.

Fill in an individual **word** in a sentence.



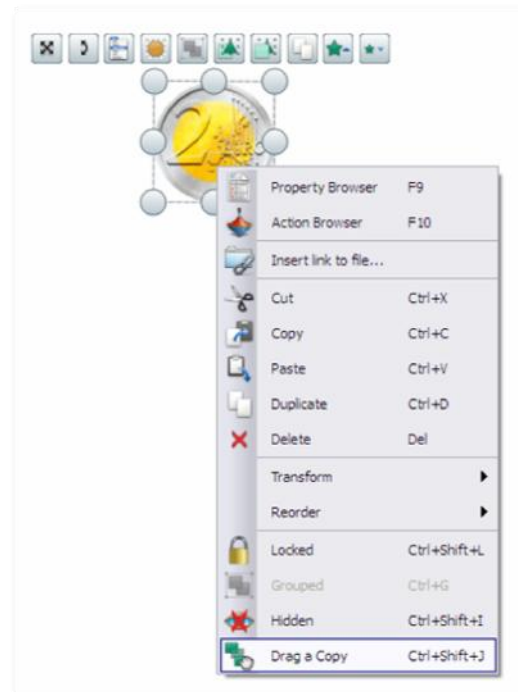
SUBJECT TOOLS

IWB software contains a number of tools that lend themselves particularly well to specific subjects. This example shows a range of interactive tools for Mathematics. These tools work like their real counterparts and can be used precisely. Initially, many tools developed around Mathematics and Science teaching. Recently however, tools such as timeline makers, spellcheckers and word generators have been developed with other subject areas in mind.



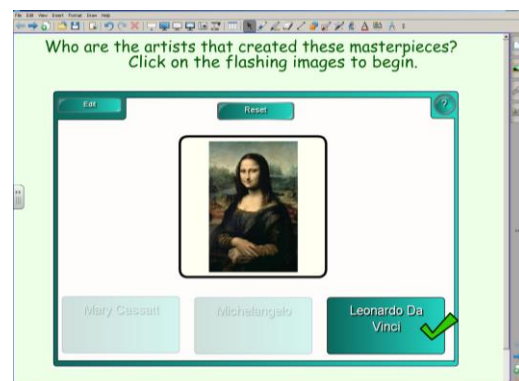
STACKING OBJECTS / CLONING AND DUPLICATING

These tools allow the user to quickly access multiple copies of the same word or image during a lesson. In essence, it creates a never ending stack of objects. The user selects the object and sets the object properties so that they automatically duplicate when selected. In the example, the coins are being set so that they reproduce on demand. Individual pages can also be duplicated within the software and advanced users will sometimes use this function to save time when developing lesson materials. They may duplicate a page and change it slightly rather than constructing a similar page from scratch.



INTERACTIVE AUTHORIZING

IWB software has advanced to the point where it is relatively simple for users to author activities that combine movement, sounds, images and text with the facility to programme specific correct and incorrect answers related to them. Example one shows an interactive multiple choice quiz that is self-marking. Example Two shows a 'Recycling' lesson that applauds pupils, using a sound file, when they recycle items correctly.



TRANSPARENCY

The transparency tool allows IWB users to change images and text so that they can become partially or fully transparent. In the example, the shape has been made partially transparent so that the squared paper can be seen through it. This could help in this context if teaching a Mathematics lesson on Area. Other subject teachers may also use this function such as layering maps so that elements of more than one can be displayed together.

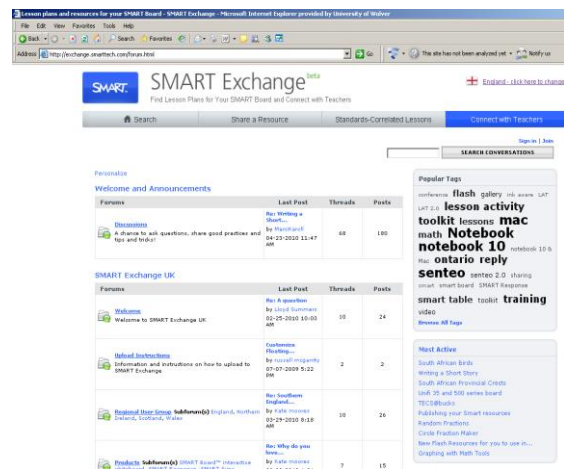
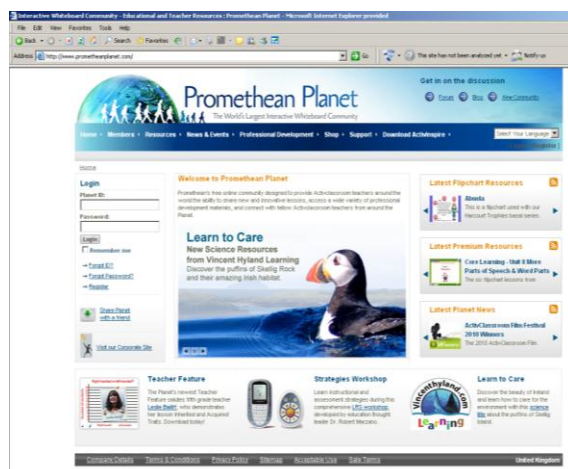
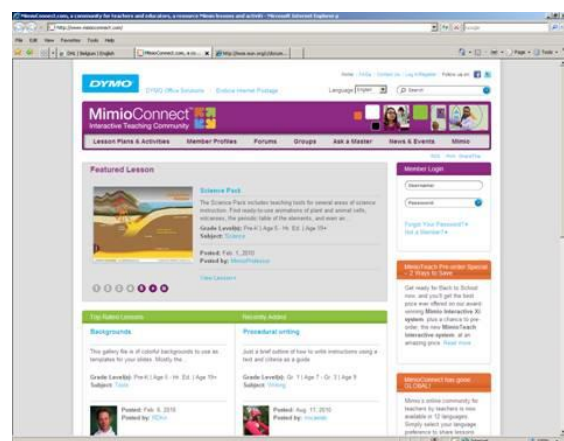


DUAL USER

Interactive whiteboard manufacturers now provide users with the option to purchase and use multi-input / multi-user technology. This means that more than one person can use the interactive whiteboard at any one time. This is accomplished by either dividing up the screen so that each user has their own section that they can control from a remote device such as a tablet, or by providing a second IWB user with their own set of tools that works on all or half of the board. This is a relatively new development in IWB technology and no users were seen to use this approach during lesson observations carried out within the EuSCRIBE Project.

USER COMMUNITIES

Many manufacturers have set up IWB user communities over the past several years. These online communities allow users to communicate and share resources and ideas through a website. Lessons can be contributed by users and downloaded by members. Some manufacturers provide additional IWB Gallery resources for download and provide news on software developments and product updates to members via e-mail. Some regional authorities and school districts have also developed their own user groups and networks that share IWB practice at a local level. In some areas of the UK, education authorities have developed exemplar interactive whiteboard materials for their teachers to adapt and use as part of their everyday teaching.



CHAPTER TWO: LITERATURE REVIEW

This literature review has been written to signpost practitioners towards some key areas of thinking in relation to the use of interactive whiteboards. IWB technology has attracted most of the research from UK academics and practitioners. Certain names have appeared repeatedly throughout the last decade (Higgins, Miller, Glover, Hennessey, Kennewell, Smith, Cogill to name but a few). Within this review, the author has retained the focus largely on the UK in an attempt to allow readers to understand the high level of interest and demand that has been created by IWB in one country and to demonstrate how future projects must build on this existing knowledge and experience. Readers may also find it beneficial to consider the European Schoolnet interactive whiteboard case studies.²

In many respects, the landscape in the UK has changed dramatically in the last five years. Evidence shows that the average primary school now has 18 interactive whiteboards, whilst the average secondary school has 38. (Becta 2009) However, we must continue to question that even though the technology is in place, this does not mean that it is being used. The innovators in the UK have moved on, but the advocates of IWB technology recognise that across Europe, as the picture unfolds, we have to question not only who can access this technology, but what must be done to ensure the consistent effective use and application of the IWB within learning and teaching.

There is also evidence to suggest that huge national investment had a significant impact on the adoption of IWB technology.

Kennewell and Higgins (2007) question:

“Why is this technology having such an influence on the use of ICT, particularly in schools, when other government policies concerning ICT have had limited impact?”

The following studies are all essential reading and help the reader to acknowledge the UK’s commitment to IWB technology:

Ways forward with ICT led by University of Newcastle (1999)

The Interactive Whiteboards, Pedagogy and Pupil Performance Evaluation: An Evaluation of the Schools Whiteboard Expansion (SWE) Project: London Challenge (2007)

The DCSF Primary Schools Whiteboard Expansion led by Professor Bridget Somekh Manchester Metropolitan University (2007)

The ICT Testbed Project set up by the Department for Education and Skills (as it was then known) and evaluated by a team from Manchester Metropolitan University and Nottingham Trent University. (2005)

² <http://moe.eun.org/web/iwbworkinggroup/library>

There has also been a notable number of Best Practice Research scholarships and ICT Bursaries. All of these studies serve as a reminder for other European countries that alongside the financial investment, there needs to be continual commitment to funding development and research to maintain the focus, evidence practice and inform thinking about how to embed the IWB within learning and teaching.

There was a clear purpose in the UK to provide the technology, but also to link the projects to learning outcomes within literacy and numeracy. This presents a defining moment because it acknowledges that whilst the technology can lead to a change in practice, provision of new resources and access to professional development; it is the synthesis of all of these which leads to the improvement in learning outcomes.

Haldane (2010) recognises the magnitude of the change process. It is a relatively complex process in that two changes are occurring in tandem: the development of new technical skills and the deployment of such skills to effect changes in pedagogy.”

Becta (2006) suggest that schools and institutions need to determine their level of e-maturity; this is defined as:

“The extent to which schools and their teachers make the use of ICT integral to teaching and planning of teaching activities and provide access to ICT inside and outside the classroom.”

This potentially huge area is compiled of three dimensions:

1. Measuring ICT infrastructure and resources
2. Organisational Co-ordination of ICT Resources
3. Engagement with learners – the extent of classroom and out of lesson use of ICT resources in school.

This supports the understanding that schools have to plan for significant investment with technology and this takes time. It also recognises that schools that are ready to integrate technology should be able to clearly understand how the innovation will link to other developments. E-Maturity can also be achieved by the individual; this work reflects the importance that needs to be placed on the strategic management of any implementation if it is going to impact on pupils throughout the school, rather than a minority of e-enabled classrooms of ICT champions.

Glover et al (2005) define:

“Missioners, tentatives and luddites within schools and consider this as key to the management of change. Whilst missioners are the practitioners at the forefront of the innovation, “luddites are those for whom the technology, even if understood, is seen as a threat and as likely to change the normal teacher - taught relationship.”

Glover and Miller (2001) discuss one particular school where whiteboards have been deployed throughout - the staff realise that they would not become proficient overnight. They “wisely see themselves as gaining competence in more complex processes over a period of up to three years.”

There is a realisation that it takes a considerable amount of time to embed the IWB within existing initiatives in school; this is an area which needs to be addressed further within the EuSCRIBE Project to understand what opportunities have been created by ministries, regions and schools to scaffold the introduction of the technology as a whole school development, rather than an ICT project.

Kennewell and Beauchamp (2007) say:

“If IWB are to meet the expectations of policy makers and achieve the claims of practitioners, there may need to be a new wave of professional development in ICT which takes account of the extended list of ICT’s features and the need to embed them in teachers’ pedagogical knowledge and reasoning.”

This acknowledges that there is a realisation that technology is here to stay. It has finally been understood that this is no longer about the introduction of the next ‘gimmick’ into school just to motivate or spark the interest of children. It has to be driven through the curriculum and be planned into whole school developments and initiatives.

Bell (2002) considers this very notion:

“Is an interactive whiteboard more than a toy or gimmick? The answer is a resounding yes! With proper planning, preparation, and training, it is a powerful instructional tool, which can be adapted for use with a wide range of subjects and ages.”

It is timely that the most recent publication brings together all of these authors and several more in a publication which will undoubtedly become a key text for researchers and practitioners alike. *Interactive Whiteboards: Theory Research and Practice* (2010) is a collated wealth of experience on this technology.

Michael Thomas and Euline Cutrim-Schmid in their opening to this book (2010) state:

“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.”

This captures the widely accepted views of researchers and practitioners alike; it is therefore crucial that this report contextualises the rapid introduction of IWB technology and defines

the direction of the issues which need to be explored further by the EuSCRIBE Project across Europe.

The following areas have all been featured repeatedly within several studies and it is because of this that the author has focussed the review in these broad areas:

- Whole Class Teaching
- Interactive/Interactivity/Interaction
- Learning and Teaching
- Training and CPD
- Resources

However, researchers who want to develop their own thinking on the use of IWB should also explore literature on the use of dialogue, questioning, personalising learning and assessment within learning and teaching.

WHOLE CLASS TEACHING

IWBs continue to be sold as whole class technologies and researchers have explored the benefits for the classroom environment. H.J.Smith et al (2005) explored the potentially positive benefits of using an interactive whiteboard for teaching and discussed each of the following:

- Flexibility and versatility
- Multimedia/multimodal presentations
- Efficiency
- Supporting planning and the development of resources
- Modelling ICT skills
- Interactivity and participation in lessons

Levy (2002) defined four main aspects of whole class teaching and her analysis notes how practitioners would demonstrate software, present and discuss information, facilitating explanation of ideas and enabling students to show and receive feedback on their work.

INTERACTIVE/INTERACTIVITY/INTERACTION

Several studies devote time to explore the meaning of 'interactive' and alongside this, the term is scrutinised to question whether or not the whiteboard is 'interactive' and does it increase interactivity in the classroom? How does it affect the interaction between teacher and pupil? What opportunities are presented for pupils to interact with each other? (Deaney, Chapman and Hennessey 2009) There are those, including the commercial suppliers, who view interactive to mean that the pupil must 'touch the IWB' with either finger or pen. Twiner notes that some researchers prefer to call it the digital or electronic whiteboard (e.g. Haldane 2007).

Studies have looked at the role of the practitioner within the classroom, the movement of pupils, the dialogue and the interface with the technology.

Alison Twiner (2010) imagines a 'dream of interactive teaching and learning':

"where users are physically, verbally and conceptually engaged, or interacting with manipulable learning resources and content, in co-constructing their understanding."

The IWB is portrayed as a technology which offers opportunity for increased engagement and interaction between teacher and pupil, and between one pupil and another.

LEARNING AND TEACHING

Early studies of the IWB viewed the innovation as the way to increase pupil and teacher ICT skills. Practitioners were sometimes reluctant to use IWB because it exposed their ability to use a computer and access appropriate resources more spontaneously in front of the pupils. Glover and Miller (2001) observe:

“Teachers are hesitant about changing pedagogy in case they are let down by their ineptitude with the basic technology.”

Some of the literature demonstrates that researchers have tried to gain more understanding of the role of the pupil and the teacher in the classroom.

Learning in the C21st: The Case for Harnessing Technology (2007) suggests:

“Particular technologies such as interactive whiteboard, act as a focus for learners’ attention and increase engagement in classroom-based learning.”

“Teachers who use IWB can work more effectively because they are freer to engage with their students and have more flexible access to tools and resources to respond to learners needs.” (P.4)

Miller et al (2005) defines the three stages of the IWB teacher as:

- Supported didactic
- Interactive
- Enhanced Interactive

Undoubtedly, we would hope the practitioner is working towards the description associated with the ‘enhanced interactive’:

- “The IWB is an integral part of most lessons
- The practitioner is aware of the techniques available [and]
- Fluent in their use and structure [of] lessons so that there is considerable opportunity for pupils to respond to IAW [IWB] stimuli.”

However, as the technology gained momentum in the early part of this decade, leaders began to realise that projects to implement the technology should be linked to curriculum developments. Several studies are of significant importance here, given their links to the introduction of the national literacy and numeracy strategies.

Higgins (2005) discusses the structure of lessons using IWB and notes how their implementation in UK classrooms has been closely linked with the three part lesson which includes a starter activity, a main part to the lesson and a plenary activity. This was introduced as part of the national literacy and numeracy strategies. Kennewell and

Beauchamp (2007) draw on the work of Hughes (2001) to discuss the construction of a four phase lesson.

Miriam Judge (2010) concludes:

“IWBs are viewed positively by both teachers and students and are seen as devices which enhance the classroom environment as well as having a positive impact on teachers’ professional practices.”

Beauchamp and Parkinson (2005) comment:

“The IWB also comes with its own specific software, which presents a challenge as another new application to master but, more importantly presents opportunities to staff and pupils.”

They consider the extra things that the whiteboard can offer:

- “Software tools
- Focusing attention
- Scaffolding learning
- Changes in Pedagogy - notably the change in pace of lessons and transitions between different parts of the lesson.
- Illustrating and explaining
- Problem Solving”

This research is particularly important as it begins to determine that practitioners need to develop these skills in order to retain their autonomy and ownership of their teaching materials. It can almost be anticipated that some teachers would prefer to be skilled enough to create their own materials.

Byron Russell (2010) suggests:

“It is perfectly within the technical competence of an increasing number of teachers to create their own materials for the IWB that both meet their precise requirements and that look reasonably attractive and professional.”

Russell also discusses that teachers need to think of IWB activities as learning objects.

“Learning objects are small (typically 2 to 15 minutes) units of learning, not a single, long linear program. They are self contained and each can be used independently.”

This is sound advice, for practitioners and commercial providers alike, but it also needs to be understood that some teachers do not consider it part of their role to create lesson materials; it is their job to deliver the curriculum. This creates a dilemma for the commercial supplier to determine whether they believe that they are responsible for providing the authoring and content creation tools or the learning objects as well. The continual divide in the skills of practitioners can almost predict that there is demand for both.

Higgins et al (2007) concludes:

“Good teaching remains good teaching with or without the technology; the technology might enhance the pedagogy only if the teachers and pupils engaged with it and understand its potential in such a way that the technology is not seen as an end in itself as another pedagogical means to achieve teaching and learning goals.”

TRAINING AND CONTINUING PROFESSIONAL DEVELOPMENT (CPD)

Much of the literature gives due consideration to the importance of training and professional development. The early use of the IWB was linked to the embryonic development of general ICT skills. This in itself is worthy of further research within European schools, because it is likely that practitioners are making use of technology and already have key skills which were not widely evident in the UK at the time IWB technology was introduced. This suggests that time must be devoted to understanding the specific features of this technology. Hall and Higgins (2005) note that:

“Training in the technical and pedagogical aspects of IWB should be viewed as a continuous process, rather than a discrete one.”

Glover and Miller (2001) discuss the lack of subject specific training. This is potentially an area which needs to be directed at the commercial supplier, as it has long been accepted that commercial suppliers focus their training on technical skills.

Kennewell and Morgan (2003) quote Davidson (2002) from a press release. Their study draws on the perceptions of student teachers, who discuss that the presence of an IWB had not yet impacted on their decision to take up a post within a school. However, if this question was asked some eight years on, it is perhaps likely that the answer would have changed for UK newly qualified teachers.

“IWB open up whole new ways of using ICT... It is important to ensure that training is provided to give teachers the skills and confidence to make use of this exciting new technology.”

Even in the UK, training and professional development continue to be a challenge. As more and more teachers gain access to their own IWB, Cogill (2010) suggests that:

“ICT skills may remain a barrier to the adoption of successful whiteboard practice.”

Haldane (2010) cites Cordingley et al (2005) who look at the benefits of collaborative CPD “in which at least two teacher colleagues were engaged.” The EuSCRIBE Project team have also designed several IWB projects which have involved at least two practitioners working together and as part of this study the researchers are keen to learn more about how schools have approached the implementation of training and CPD.

RESOURCES

From the very outset, IWB have enabled the practitioner to provide pupils with an opportunity to access electronic resources and, as internet access has grown, so has the ability to access a prolific amount of web based materials. The research has also given due consideration to the fact that the IWB is not a replacement for the teacher or existing resources; it is about enabling the practitioner to make a decision about which aspects of ICT use are most appropriate.

Kennewell and Beauchamp (2007) observe that:

“ICT does not necessarily replace these more traditional tools and resources (although ICT has the potential to incorporate all of them into a single format); in some situations the traditional medium may be more appropriate, or it may be used effectively in combination with ICT”.

Recent literature, such as the Harnessing Schools Survey 2009, has also acknowledged that some practitioners can readily create their own materials:

“Teachers also appear to be coming more adept at creating and sharing digital learning resources. Around three quarters of secondary school teachers, along with around half of primary and half special school teachers, stated that they often create their own digital learning resources.”

However, the survey does not capture the quality of those materials, nor what needs to be done to engage with those who continue to lack the necessary skills that are essential to overcoming the barriers with the technology.

This is particularly important as practitioners often begin by thinking that the technology needs to be used for the whole of the lesson. However, Hughes sees the lesson divided into sections where some parts include use of the IWB, and by the whole class, but some phases will involve use at certain times accompanied by other individual activities. It will be an important part of the EuSCRIBE Project to observe when and how practitioners use the IWB within the lesson.

Finally, Moss and Jewitt (2010) focus the objectives of the EuSCRIBE project:

“Other countries are now in a position to learn from England’s experience with IWBs. In many ways their interest is driven by a shared assumption that education is out of step with new times if it does not incorporate new media and expose children to what those new media can do.”

But, perhaps for some, the challenge is more complex than this; at every level there needs to be a decision making process about the purpose of the technology and clarity about how it meshes with existing methods and approaches. It is about being able to make informed choices.

Commercial suppliers have continued to respond to the demands of the C21st teaching and learning environment by creating a new wave of technologies and resources. As Bax (2010) suggests:

“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).

Practitioners need to accept that the technological canvas will never be blank; it will constantly be surpassed by the emergence of another device for either the classroom or the individual. However, it is the teacher who has to be able to embrace the emerging technologies whilst considering what needs to be done to demonstrate to pupils how to access and explore their learning environments.

In 2010, the UK has moved on and IWB no longer dominate the discussion when introducing new technology within learning and teaching, but the key areas within this literature review are ongoing and need to be revisited. E-Portfolios and learning platforms are the current ‘buzz’ technologies, and this study is a reminder that it is necessary to embed practice and to continue to seek to renew access to professional development and resources.

This literature review has enabled the author to realise that if we continue to view IWB as a tool for embedding the use of technology, we will not even begin to explore the full potential. We have to consider the IWB as a specific tool in a rapidly expanding digital pencil case and seek to understand how we can implement the technology for all practitioners. This requires a huge change management process.

Bax (2010) suggests that:

“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.”

Current practitioners can learn from the research that the effective implementation requires careful analysis of existing practice, detailed planning and provision of appropriate training and professional development, but this needs to be managed at all levels and linked to other strategic developments to allow the school to ‘normalize’ this technology.

CHAPTER THREE: OVERVIEW OF THE METHODOLOGY

The aim of the EuSCRIBE Project was to develop guidelines for the use of interactive whiteboards. Whilst this project has had tight timescales, we have collected evidence from several ministries within the European Schoolnet interactive whiteboard working group. Beyond this, we have also developed a survey which has been circulated to practitioners.

This report, however, does not attempt to itemise best practice in the particular countries surveyed/visited. The objective is more to elicit and highlight guidelines for best practice that will be of assistance to both teachers and policy makers across Europe including those schools and Ministries that have not yet implemented IWB technologies as part of their ICT strategy.

SURVEY

The purpose of the survey was to collate the views of IWB users from across the ministries within the IWB working group. This gave a broader perspective to the project and helped us to identify some of the key themes and focus areas for this research. It has been accepted that a limitation of the study is that it was only available in English.

LINK RESEARCH VISITS

The link research visits have taken place across four countries including Ireland, Italy, Portugal and the UK. This has allowed the project team to gather evidence of current practice with the use of interactive whiteboards. Most of the visits were to schools that have been using IWB for approximately three years, but the technology was not always available in every classroom. The team observed practitioners using several different brands of technology, though it is important to emphasise that this does not impact on the research. No direct reference has been made to specific commercial suppliers.

OBSERVATIONS

The EuSCRIBE team have developed an observation record sheet which has been included in this report as an appendix. This has enabled the team to record the use of the interactive whiteboard within lessons and to begin to look at some of the commonalities in practice. The final page of this proforma has been divided into four sections; these are not progressive levels of use, but instead outline the specific main uses of IWB that can be achieved. This grid enabled the practitioner to look at their own use of the technology and to identify areas for development. The EuSCRIBE project team were also able to highlight with the practitioner how other IWB skills might have been introduced within the lesson.

FEEDBACK AND INTERVIEWS

All of the practitioners involved in this research took part in either an interview or one of the focus groups. This was an important part of the study as it gave the project team the opportunity to ask questions based upon practice that had been observed. The EuSCRIBE Project team also believe that an extremely valuable part of this study was to give the teachers feedback immediately after the lesson observations; in some cases this was to the

individual or in small groups. This gave the project team and the practitioner the time to share tools and applications that were utilised within the lesson and to discuss why the lesson had been structured as it was.

FOCUS GROUPS

The focus groups brought together groups of 6-30 practitioners; this varied from country to country. The purpose of these was to allow questions to be considered in the form of a discussion and to allow colleagues to demonstrate their practice to each other. The focus groups were particularly helpful when working with colleagues who were in the embryonic stages of using interactive whiteboards and with practitioners who had only one whiteboard in school. The focus group meant that several practitioners from different schools could come together to consider their responses. Discussions within the focus groups highlighted that there is still a 'missioner' (Glover et al, 2005) or ICT Champion pioneering IWB practice and schools are not necessarily clear about their next steps.

MEETINGS WITH THE COMMERCIAL SUPPLIERS

The project director met with several commercial suppliers to consider the key themes of the research. This has helped to focus the key themes within the guidelines. These meetings also highlighted some of the questions that need to be given further consideration by the ministries or authorities responsible for the implementation of the interactive whiteboards. For example, what type of training plan is agreed as part of the procurement process?

CHAPTER FOUR: GUIDELINES FROM THE RESEARCH

The seven themes below have emerged as the key headings from within this research. The EuSCRIBE Project demonstrates that effective implementation of IWB technology links many aspects of whole school development and can be the trigger to address curriculum innovation and improvement. Each of these guidelines has been presented in turn with the questions and discussion that have been gathered with the support of practitioners who shared evidence of their work with the EuSCRIBE team.

1. LEADERSHIP AND ORGANISATION

2. PURCHASE, INSTALLATION AND MAINTENANCE

3. ACCESS

4. CLASSROOM MANAGEMENT

5. LEARNING AND TEACHING

6. TRAINING AND CONTINUING PROFESSIONAL DEVELOPMENT

7. RESOURCES

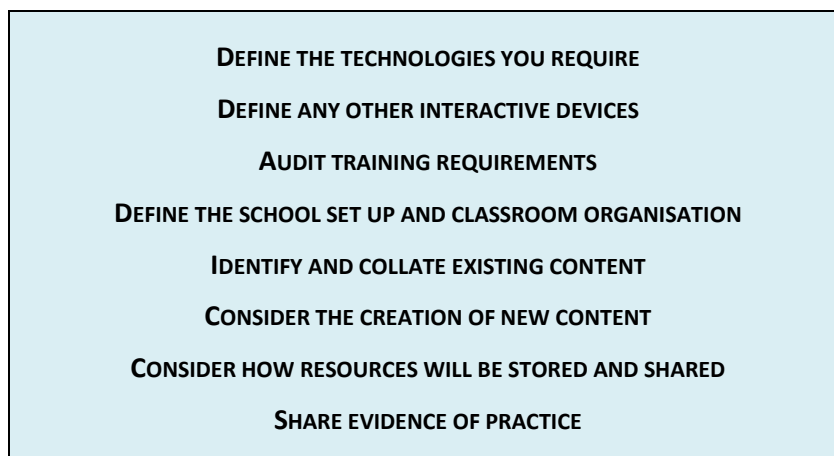
1. LEADERSHIP AND ORGANISATION

1. What is the role of the commercial supplier within the implementation process?
2. What is the role of the regional adviser within the implementation process?
3. How does the implementation of IWB fit with other technologies?
4. How can the school implement IWB technology effectively?
5. How can the integration of this technology be linked to existing initiatives?

- ❖ Choosing the right person to lead the implementation of the interactive whiteboards within an organisation is vital to the success. The challenge for most at a national, regional and local level is that there are too many initiatives happening at the same time and trying to synchronise these can be impossible.
- ❖ Regional advisers or similar should look to provide opportunities for clusters of schools to develop initiatives together. This could include joint training, and creation of content. It may also be helpful when trying to address subject specific materials.
- ❖ The headteacher has to show commitment and leadership to the long term and continual investment in technology; this is not the job of the ICT Co-ordinator in isolation. The research has shown that schools can find it particularly successful to have a learning and teaching team. This is most likely co-ordinated by a member of the senior management team. The role of this team is to decide when, why and how the whiteboards will be put into the classrooms, but also to demonstrate to others the effective uses and application of this technology within learning and teaching.
- ❖ A learning and teaching team needs to be a microcosm of the school, representative of subjects and phases. The team needs to be able to acknowledge the school development plan and be the bridge between the senior management team and classroom practice. The practitioners should be able to identify the gaps in their knowledge, skills and understanding. The learning and teaching team are pivotal to being able to identify how technology can be interwoven at the same time as other initiatives. There are a few examples of where schools have given staff the opportunity to 'bid' for the installation of equipment as a priority within the school, identifying areas of priority and detailing how evidence of practice will be shared with colleagues.

MAKING INFORMED CHOICES

- Who is responsible for leading the developments?
- What are your priorities for the use of learning technologies?
- What are the timescales?
- How will you achieve your goals?



- ❖ The survey showed that in almost 50% of schools, the head teacher is responsible for the purchase of the IWB, whilst in a further 20% the lead teacher for ICT is responsible. It is imperative that such decisions are determined by more than one individual and this is where it can be helpful to consult staff to gather their views. There is an apparent gap between a decision being made at a ministerial level to purchase IWB and schools still working in isolation to make this a reality.
- ❖ Prior to the purchase of technology and as part of ongoing training and continuing professional development, schools should look to provide opportunities to observe practice. Commercial suppliers could look to support this by offering incentives to leading practice schools at a regional level. The new user has to be able to understand how to make best use of the technology.
- ❖ The EuSCRIBE Project visited schools that have shown commitment to developing the use of the interactive whiteboard. This has included identifying a lead teacher to work with staff in order to demonstrate effective use of the software, to team teach, to lead lessons and to give feedback. Whilst one person can co-ordinate all of this, it is useful if the development can take place in teams as individuals become complacent and use of the software can plateau.
- ❖ Leaders and practitioners need to look to develop opportunities to share practice. This is not a process that is within existing practice for all countries. However, staff should be encouraged not to inspect or judge, but to create, demonstrate and reflect in collaborative groups.
- ❖ Commercial suppliers should provide opportunities to demonstrate leading practice to principals, senior teachers and learning and teaching teams. This could be a recognised part of the procurement process. The ministries also need to share examples of practice within each country.

- ❖ It is evident from this research that schools need to consider the IWB within policies and planning. Staff need to know how to evidence the use of digital content and the IWB. This can be particularly important because otherwise staff have the potential to make repeated use of digital resources without up skilling the pupils at all.
- ❖ Where staff are not considering the IWB as part of their long term planning, there is evidence that practitioners download web based materials purely for *ad hoc* and spontaneous learning. This sometimes means that activities have been selected for their motivational aspects, because they are fun and engaging, and not necessarily linked to the curriculum or planning. This can mean that activities may not have learning outcomes and have been used purely to engage the pupils.
- ❖ Leaders need to make time for CPD including their own development. As one Assistant Principal commented: “The senior teacher who is called upon to lead a class can find it intimidating if they do not have the skills to operate the IWB.”
- ❖ One teaching assistant commented: “We have had our interactive whiteboards six years, they are under-used, they still look new and most staff feel that they are new because there are too many other initiatives going on in school.”
- ❖ Schools should also find time to demonstrate the technology to parents and governors.

2. PURCHASE, INSTALLATION AND MAINTENANCE

PURCHASE

1. What purchase models are available to schools/local authorities/regions?
2. Who delivers product demonstrations?
3. What opportunities are available to observe practice before purchase of new kit?
4. Do you have access to any leading practice/exemplary schools?
5. What opportunities exist to be involved in regional projects/national initiatives?
6. Will the school need to consider the amount of direct sunlight that classrooms receive before selecting projector specifications?
7. Is the IWB the correctly sized proportionally for the room? Can the students see the IWB correctly?
8. At what height will the IWB be fitted at? Will fixtures and fittings need to be adapted to allow the IWB to be fitted appropriately? Will there be enough electrical sockets available?
9. What type of computer will link to the IWB? PC, Laptop?
10. Consider the purchase of other interactive devices which could enhance the learning and teaching.

- ❖ Each ministry has taken a slightly different approach to the procurement of interactive whiteboards, and for some, the ultimate decision about which system to purchase and how to implement the technology has been passed to the individual school.
- ❖ The research suggests that it can certainly be helpful for the ministry to make the decision that a single brand of IWB software should be adopted by the region. There are now some countries which adopt a mixed economy of IWB, but this needs clarity between the ministries and commercial suppliers about contractual agreements. This would then make initial training, implementation programme and the provision of upgrades much easier.
- ❖ The commercial suppliers believe that the tendering process is not always helpful as they cannot always engage in dialogue with the ministries, regional advisers or the schools. Yet, it is extremely helpful to ensure that there has been consideration of what each organisation is trying to achieve with the technology.
- ❖ It seems that even though IWB have been used within education for more than a decade, there is still reluctance to buy or provide more than one per establishment at the early stages of implementation. The price of this technology is now significantly less. Suppliers face a challenge in providing support for countries across Europe to ensure that old mistakes are not repeated. A practitioner working in isolation faces a constant battle to develop ideas which perhaps exist elsewhere, but working alone means that there is little time to research how to build on existing practice. One of our key recommendations is that suppliers should provide a minimum of two

interactive whiteboards per initial installation for an establishment. This would allow for more collaboration between practitioners on a day-to-day basis.

- ❖ There are also frequent examples within several countries of where schools have bought more than one brand of IWB. Schools that have been involved with various initiatives and projects have sometimes been 'given' a different IWB to what they already have. Schools need to recognise that it is incredibly difficult to share resources and ensure consistency of use by teachers and pupils when IWB are not the same throughout the school. This is particularly noticeable in some European secondary level schools where the teacher moves throughout the day and not the pupils. It can mean that staff do not access the same training or resources and this is not effective. It is therefore recommended, that even though staff may have different IWB, it may be more cost effective to make sure that they have access to the same authoring software for the preparation and delivery of lessons.

INSTALLATION AND MAINTENANCE

1. What key decisions are needed prior to installing IWB?
2. What support do schools receive with this?
3. Who carried out the initial software and hardware installation?
4. What are the key issues to consider for maintenance of the IWB?
5. Is there a designated person with responsibility for IWB within your school? Who is responsible for day-to-day maintenance?
6. What problems have you encountered since purchase?
7. What technical support is available / helpline / website/ FAQs?
8. Will the practitioner know how to troubleshoot simple technical issues and how to get these resolved?
9. Who will undertake the maintenance of the projector?
10. What warranties are available? How can schools access support if equipment is under warranty?
11. Who will download the new version of the software, including all resources?
12. Who will keep the teacher's laptop up to date?
13. Who is responsible for the e-safety and internet protection?

- ❖ Purchasing interactive whiteboards can be costly if thought has not been given to CPD, software, content and ongoing support for practitioners.
- ❖ Schools do find it difficult to keep up with the ongoing maintenance of technology. Commercial suppliers could provide further support to make this easier. Certain services could be 'managed', but this may bring with it unnecessary costs for some schools. At the very least, someone within the region needs to know the regular maintenance requirements and how common technical issues can be resolved. Although commercial suppliers have 'helpdesks', it is rarely practical or feasible to telephone for help in the middle of a lesson!
- ❖ Technical issues cannot go unmentioned and must be addressed at the beginning of any implementation process. The Harnessing Technology Schools Survey (2008) highlighted this: "Having dedicated on site technician support in a school appears to have a positive effect: a statistically significant associate was found between reported teacher enthusiasm in using ICT to deliver the curriculum and the level of technical support available in a school."
- ❖ Evidence from within this project has highlighted that technical support is essential. Some schools do have their own technician, even if it is for only a few hours per week; it is important for leaders to consider how practitioners will be supported with their implementation of the technology. Technicians, however, are often seen as already having too much to do. Commercial suppliers could provide specific training for a technician which begins to address some of the longer term issues within schools, e.g. upgrading software, making best use of resources, making materials available to pupils beyond the school day.

- ❖ Some schools in the UK have looked to address technical support together by employing a joint technician and positive examples of this have also been reported in the Czech Republic As one UK practitioner commented, “we have to remember that our technician has a big enough job to provide technical support and we cannot expect him to provide training to our teachers when he has no experience of working with pupils.”
- ❖ It is particularly important for schools to know how to access support if their equipment is under warranty.

DATA PROJECTORS

- ❖ Front projection interactive whiteboards and other interactive systems work in conjunction with a data projector. Recently, this technology has advanced greatly. Most projectors allow the IWB to be used in well lit rooms with lots of natural light. Some IWBs installed previously used less powerful projectors and suffered from faintness or poor image quality. These were generally updated and replaced over time. In some contexts, however, poor performance of projectors is directly related to a lack of general maintenance undertaken by the school. Some institutions fail to clean filters and follow recommended procedures and have no member of staff with responsibility to do so. This can lead to failure of the projectors over time. Some IWB resellers offer a cleaning service for projectors at an additional cost.
- ❖ Several years ago commercial suppliers introduced short-throw projectors that project the image from a location very close to the IWB surface. This has been popular with practitioners as it has reduced shadowing and glare during use.
- ❖ Modern data projectors in school based IWBs are sometimes designed to work only via a remote control, having no control buttons on the unit itself. This is to minimise the likelihood of theft. As a security measure, the school needs only to keep the remote controls secure, as without them the data projectors cannot be operated and are therefore less of a target for thieves.
- ❖ Schools should keep a supply of spare projector bulbs in stock, especially if the school has a large number of equipped classrooms. This can minimise waiting time for a replacement once the bulb comes to the end of its natural life.
- ❖ One commercial supplier commented that: “the IT Technician is often underpaid, under informed and completely removed from learning and teaching.”
- ❖ Practitioners have stated that they have also been able to get support with maintenance of projectors from the IWB sales company. Schools need to allow time for filters to be cleaned on a regular basis; otherwise it can mean that classrooms are without the projector whilst they are serviced by an external company.
- ❖ Commercial suppliers need to take more responsibility for updating software in schools. This may mean that new provision should demonstrate evidence of a longer term partnership to support updates and access to CPD. Commercial suppliers often provide their software as a free download. Where this is not the case, there may be an IWB viewing utility or free trial period that allows temporary access to it.

- ❖ With the advent of learning platforms (Virtual Learning Environments), some schools are now beginning to post IWB files so that pupils and parents can access them from home. Some software allows notes and lesson materials to be exported into Portable Data Format (PDF) that can also be accessed from most computers.

3. ACCESS

1. Where should the IWB be situated?
2. How often should the practitioner be able to access the IWB?
3. What if the practitioner does not have an IWB in the classroom?
4. What advice is given by the commercial supplier set up?
5. How should the classroom be organised?

- ❖ Deciding where the first interactive whiteboard is going to be placed in school can be a poignant decision. Ultimately the success of the first installation can determine how other members of staff will view the technology.
- ❖ Access to the interactive whiteboard is a key factor. Unfortunately, some schools are still choosing to put the interactive whiteboard in the computer lab so that more practitioners can supposedly access the resource. However, practitioners who have worked with the EuSCRIBE Project have stated that real access only begins when there is an IWB situated in the classroom where the teacher works. The teacher needs to be able to decide when and when not to make use of the technology. The survey showed that 15% of respondents have full access to an IWB for every lesson.
- ❖ Some schools have highlighted that they have deliberately chosen access in computer labs, but this is so that pupils can complete the main activity within the lesson on an individual computer.
- ❖ Access also means that the teacher is able to practice using the software on the IWB before the lesson and access to prepare materials beyond the school day. This should include access away from the school premises.
- ❖ It is not just about having access to the IWB, it is also about having access to a computer which has the relevant resources so that teachers can prepare lesson materials.
- ❖ Some teachers believe that the IWB should only get turned on and off at the beginning and end of each day. The truth is, it needs to be accessible so that the teacher can plan for regular use and also be able to make spontaneous decisions within the lesson.
- ❖ Practitioners should know that they are going to get an IWB in their room, and should ideally be able to consider the layout of the classroom before a new IWB is put in place. There are still examples of the IWB arriving in the school holidays and being placed in an area of the room that makes it hard to reorganise seating.
- ❖ Most classrooms choose to site IWB in a central area of the room, at the front. It is, however, equally important to consider whether it is necessary to move other furniture or to ask the pupils to sit differently.
- ❖ Practitioners should plan the layout of the room based on the tasks that the pupils will have to do. Whilst younger pupils may find it difficult initially to sit on a carpet

area and move back to their desks, this can be helpful to ensure that all pupils can see the IWB.

- ❖ With secondary school/older pupils, it is likely to be more appropriate to leave them at their desk/table. However, practitioners should also consider opportunities for dialogue or more collaborative tasks away from the IWB.
- ❖ Over half of the respondents to the survey indicate that they currently have access to between 1 and 5 IWB to deliver lessons. This highlights that whilst schools may have adopted the IWB technology, it does not necessarily mean that teachers have regular access.

SPACE AROUND THE IWB

- ❖ Whilst not every lesson will involve pupils going to the IWB, it is essential that all pupils can see the detail on the screen. There also needs to be room for the teacher and the pupil to stand adjacent to the IWB outside the projected image without furniture in the way.
- ❖ Long classrooms or wide classrooms can sometimes make it difficult for pupils on the outer edges to see the IWB. With this in mind, some practitioners in these rooms have found it more appropriate to consider the layout of the room.
- ❖ Practitioners should also consider what is on the display boards adjacent to the IWB; it can be extremely distracting for pupils to locate relevant information when they can see too many other materials.
- ❖ Pupils should also be able to access the IWB, the latest installations allow for the devices to be moved up and down, but some classrooms still have platforms for younger children.
- ❖ The position of the interactive whiteboard is crucial and early adopters of the technology have sometimes forgotten that, unlike some other technologies, the equipment remains in the room.

4. CLASSROOM MANAGEMENT

1. In which parts of a lesson do you use the interactive whiteboard?
2. Are there lesson segments in which you use it more frequently? i.e. introduction / starter, main activity or plenary.
3. What are the key things that you need to consider when planning your lesson?
4. What are the benefits of using interactive whiteboards in the lesson introduction, plenary and main activity?
5. What exemplary materials are available to teachers looking specifically at what they are delivering within the lesson?

- ❖ Regardless of the technology, lessons need to be prepared and pupils need to know what they are learning. The layout of the classroom can be particularly important to the teacher. Unfortunately, some teachers continue to work in a very static environment.
- ❖ Practitioners have reported that it can be helpful to have an additional surface to write on alongside the whiteboard. Many practitioners make regular use of a dry wipe board alongside the interactive whiteboard to note the lesson objectives, the learning outcomes, the homework, the key vocabulary etc., so that certain information remains constantly available to the pupils and the teacher.
- ❖ The structure of the lesson varies according to the style of the practitioner. However, the practitioner does need to give some consideration to when in the lesson the whiteboard will be used.
- ❖ Lesson observations within the EuSCRIBE Project showed that some teachers continue to make use of the IWB throughout the lesson. Integrating the IWB into existing lesson material can take time, but practitioners may find it useful to consider the structure of the lesson.
- ❖ In the UK, a huge amount of work has been undertaken within the National strategies to ensure that teachers deliver a three-part lesson in literacy and numeracy and many practitioners continue to adopt this approach regardless of the subject. The observation form included within these guidelines outlines the starter, the main activity and the plenary.
- ❖ Schools need to consider where to keep whiteboard pens and the remote control so that equipment does not get lost or stolen.
- ❖ Teachers need to retain their autonomy, but this also requires them to take responsibility for their own learning.
- ❖ Whilst teachers want to develop their own lesson materials, this can be a huge task for every subject initially. The EuSCRIBE Project would recommend that the practitioner identifies a focus area for development. For example, a Primary practitioner may choose to develop literacy resources; this does not mean he or she only uses the whiteboard for literacy, but prioritises this subject and therefore spends more time gathering, developing and sharing the lesson activities. If

practitioners within the school identify their chosen area, this can lead to more resources.

- ❖ By comparison, a secondary practitioner will choose to focus on a particular year group. For example, if one teacher takes year seven and another year eight science resources, this means that more resources are created, and teachers can consider how to prepare something that can be used by someone else.

5. TRAINING AND CONTINUING PROFESSIONAL DEVELOPMENT

1. How are new practitioners introduced to interactive whiteboards?
2. What expectations are given to staff about using the equipment?
3. Was this a technical induction or did you also learn how to use the systems within lessons? (including the opportunity to develop new ideas)
4. What methods of training have been provided to ensure all staff are effective users of interactive whiteboards?
5. Was this training beneficial? What aspects worked best for you?
6. Who is available to give day-to-day technical advice?
7. Are there any aspects of interactive whiteboards that you find difficult to use?
8. In your opinion, are all staff aware of the breadth of uses to which interactive whiteboards may be put to use?
9. What plans exist to encourage staff to undertake accredited training?
10. What continued external support do you provide?
11. What long term CPD is available?
12. Have practitioners had the opportunity to observe practice?
13. What subject specific training is available?

- ❖ The case studies from the Interactive Whiteboard Working Group show that Ministries, regional authorities and individual schools have approached training in various ways and the most important conclusion is that long-term training needs to be planned as part of any effective use of interactive whiteboards.
- ❖ The training for the use of interactive whiteboards is ultimately pivotal to their success. Too often the plan for training comes after the purchase, but this needs to be in place before. The commercial suppliers identify that where training has been included in the invitation to tender, then this shows that the organisation has given consideration to the full extent of their purchase.
- ❖ Schools need to undertake an audit of ICT competencies and also audit of IWB competencies prior to any initial training. Schools need to acknowledge that whilst the introduction of interactive whiteboards may help to address general ICT confidence and competence; this is not a good enough reason to justify additional purchase of IWBs.
- ❖ Training takes time and schools cannot expect practitioners to 'find time' to participate in training which is essential.

TRAINING AND CONTINUING PROFESSIONAL DEVELOPMENT

<p style="text-align: center;">IMPLEMENTATION AND REVIEW</p> <p style="text-align: center;">AUDIT OF ICT CONFIDENCE AND COMPETENCE</p> <p style="text-align: center;">AUDIT OF IWB CONFIDENCE AND COMPETENCE</p> <p style="text-align: center;">TECHNICAL INDUCTION</p> <p>Commercial Supplier should provide a three-hour face to face technical induction</p> <p style="text-align: center;">PEDAGOGICAL TRAINING</p> <p>A follow up session should begin to explore some of the pedagogical implications for the practitioner. This should be a second three-hour face-to-face session.</p> <p style="text-align: center;">CONTENT DEVELOPMENT</p> <p>Practitioners should be given a third face-to-face session which allows time for content development which the teacher can use in his/her own classroom and share with colleagues within and beyond the school.</p> <p style="text-align: center;">EXPLORE OPPORTUNITIES TO SHARE PRACTICE</p>
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- ❖ Practitioners working with pupils at secondary level would particularly welcome training which is subject specific. During the EuSCRIBE Project, we observed examples of where practitioners are not aware of the interactive whiteboard resources that are available for specific subjects; for example, a maths teacher did not know that the IWB software has a protractor. This emphasises the importance of development time for practitioners to explore the software. The teacher has to take some responsibility for this as part of his or her own professional development.
- ❖ The interactive whiteboard supplier should offer as a minimum:
 - 3 hour technical induction
 - 2 further 3 hour sessions to include pedagogical training and content development and individual creation of materials
 - Groups should have no more than 12 for training — to allow staff to interact with the IWB.
- ❖ The questionnaire and the interviews from this research demonstrated that practitioners feel that more training is necessary. It is acknowledged that it takes time to embed practice and the basic technical induction is rarely enough to allow the practitioner to maximise the potential of the technology.
- ❖ However, schools do not always plan for continuous and longer-term developmental training. This is not just desirable, but essential to success.
- ❖ One teacher commented that he is responsible for the training in school and it can be incredibly difficult to stay ahead of the latest version of software. He suggested that it might be useful for lead users to have early releases of the latest version to ensure that they can be aware of the new content before leading training sessions for staff.

- ❖ Commercial suppliers should also consider the training that is available from resellers or external companies who sell IWB resources. Some practitioners state that whilst these providers can deliver technical skills, they are not able to offer subject specific training. The Ministries and regional authorities should also identify where specialist training will be available from.
- ❖ 26% of respondents to the survey state that they are self taught users of the IWB. This indicates that there is still work to be done to ensure adequate training provision. Only 7% of respondents have actually worked with an expert user in their own classroom to collaboratively deliver and 'team-teach' their lessons. This suggests that there is the potential to explore the notion of team teaching further within regional and national projects. 20% of the respondents state that one of the main problems that they have encountered using the IWB is the lack of appropriate training.
- ❖ All staff including practitioners, learning support assistants and technical support personnel should have ICT targets which are part of their continuing professional development plan. These need to reflect both the needs of the individual and the school. The head teacher and the senior management team should also participate in the training; this will send a clear message that this technology is a significant investment for the organisation. Commercial providers, Ministries and regional authorities could also look to provide specific training for leaders to help them understand how IWB technology can begin to address school improvement.
- ❖ In more than one European country it has been noted that the vendor can determine the ultimate success of the technology. Commercial suppliers have recognised the need to provide training which is beyond the 'technical mastery' of the equipment. However, further consideration needs to be given to the long-term support that is available to schools. Beyond the initial induction, some practitioners still currently receive no additional training in the use of the IWB.
- ❖ Some commercial providers do offer accredited training which is largely available on-line. However, practitioners must understand that this is rarely enough. The commercial suppliers need to be more aware of what is available at a local, regional and national level. For example, several regions have their own digital repository or knowledge base. If practitioners are to be encouraged to make best use of such resources, then commercial suppliers need to demonstrate this as part of their training.
- ❖ Practitioners have emphasised the value of workshop style training which involves a blend of face to face instructional training, but with practical input. Although it can be time consuming, it is acknowledged that it is extremely useful to be given tasks to complete beyond the workshop in time for the next session. This means that the practitioner has to practice the skills away from the classroom and can begin to evidence whether he or she has actually understood how to do a specific task. This is where it becomes more cost effective for the commercial supplier to engage with local practitioners to provide ongoing training and support at a local level.
- ❖ Schools should also look to explore training pupils to understand the technical skills to operate the IWB. There is evidence to show that pupils enjoy learning how to

master the software and there are also examples of older pupils creating resources for younger pupils. This is something that could be explored further. Commercial suppliers, regional authorities and individual schools could look to offer training to pupils who, in turn could share their skills with teachers.

- ❖ Advisers and regional training providers need to give consideration to how they can provide professional development which is linked to assessment, personalising learning and specific areas of the curriculum that would be beneficial to whole school development.
- ❖ Commercial suppliers should look to develop opportunities for leading practice to be shared and encourage schools to take responsibility for their own professional development. There are still too many examples of one teacher demonstrating good practice in isolation, rather than whole schools working together.
- ❖ Schools could also look to work in partnership with neighbouring schools to develop practice together.
- ❖ Whilst companies provide accredited training, practitioners' views of this are very mixed. Practitioners welcome the opportunity to be able to access the training as and when they can, but this is frequently out of school hours or at weekends.
- ❖ Training providers need to know what projects and initiatives exist within the localities.

6. LEARNING AND TEACHING

1. In general terms, what do you use the IWB for?
2. Can you give an example of a successful activity that you have undertaken using an IWB?
3. What skills / expertise do teachers need in order to make effective use of the IWB system?
4. Are there any areas of the curriculum that you find particularly lend themselves to IWB use?
5. How long does it take to prepare an IWB activity?
6. How do you use your interactive whiteboard system?
7. In what ways do you think interactive whiteboards can help you in becoming a more effective practitioner?
8. How do you organise children of different abilities?

- ❖ Interactive whiteboards are largely recognised as a whole class presentation technology.
- ❖ Practitioners who have made regular use of the technology soon wonder how they ever managed without it. Within the project, practitioners acknowledge that the whiteboard can be particularly helpful when:
 - Introducing key ideas
 - Researching information
 - Presenting lesson content
 - Showing film clips
 - To evaluate lessons and projects
- ❖ Lesson content can be saved, modified, printed, used again and shared with other colleagues. However, all of these skills are only an advantage on an interactive whiteboard, rather than other technologies, if the practitioner makes use of the specific interactive whiteboard software.
- ❖ Commercial suppliers and publishers have made significant progress with the types of materials that are now created for use within learning and teaching. Some practitioners still depend heavily on using complete lesson content and materials. The recent introduction of lesson activities that can be adapted by the practitioner has been welcomed. However, not all schools may know these exist if they do not operate the latest version of the software.

1. Do you notice improved pupil motivation during lessons? If “Yes” do you think that this can be sustained over the long term?
2. What are the teaching and learning objectives - are these visible to the pupils?
3. How are support assistants or other adults used when using interactive whiteboards? Deployment, location, role etc....
4. How do classroom ‘dynamics’ change when you are using interactive whiteboards?
5. How can practitioners and pupils access the IWB materials before, during and after the lesson?
6. Are the pupils invited to the IWB or are they encouraged to approach?
7. What kind of dialogue is taking place in the classroom?
8. Why should practitioners keep a record of what is delivered on the IWB?
9. What can the practitioner do to ensure that every pupil is making individual progress?

- ❖ Some practitioners still continue to believe that it can take hours to prepare a lesson activity. The EuSCRIBE Project suggests that as a guide, a one hour lesson should take 30 minutes preparation of the digital content for the IWB materials. (Half the delivery time) If materials are taking longer to prepare using IWB software, this perhaps begins to indicate that the practitioner needs further training, or better access to resources. Practitioners may take longer to prepare the lesson content, but this is dependent on other factors including experience, subject knowledge and intended learning outcomes.
- ❖ Alongside the training of practitioners, the senior leadership team in school should also consider how resources are going to be stored and shared with colleagues.
- ❖ Practitioners continue to raise concerns about “double preparation” for lessons in case of technical issues or loss of internet connection. This is a valid point, but teachers should always have activities for the pupils to undertake individually or in groups which do not involve access to the interactive whiteboard. It is not realistic to have an individual back up plan for every single lesson; this is when teachers have to be skilled enough to draw upon other resources.
- ❖ Within the lesson observations and teacher interviews, we also observed that the position of the practitioner can be particularly important to the lesson. Some teachers take an instructional and didactic position at the front of the classroom near the IWB. Pupils are invited to the IWB and instructed what to do. In other classrooms, teachers move around the classroom and provide opportunities for pupils to contribute their thoughts or ideas at the IWB. This can vary according to the age and subject being taught as well as the general delivery style and confidence of the teacher.

- ❖ Practitioners need to consider the abilities of the pupils that they are working with when using the IWB. This can include: the position of the pupils, the content on the IWB, the amount of content visible to the pupils and the layout on the IWB. During this project, the observations showed that some practitioners used large amounts of text on the IWB in fonts that were difficult to read.
- ❖ The survey also highlighted that only 10% of respondents currently use the IWB to share pupils' work with the rest of the class. This is an area that can be developed by schools.
- ❖ Commercial suppliers have created content strategies and given due consideration to the needs of publishers. However, there needs to be development of quality standards for content.
- ❖ The IWB should largely be considered as a whole class technology. With this in mind, the practitioner needs to consider how long it should be used for within the lesson, and whether or not it is appropriate to use the technology for the whole lesson. We should perhaps question whether any resource can be used effectively with the whole class in isolation for 50 minutes, regardless of whether it is a PC or an IWB. Some practitioners aptly demonstrated that there is perhaps a time and a place for using only the IWB throughout the lesson, for example, with infants when looking at the development of communication skills or with older pupils when introducing or revisiting a topic; this provided evidence that the IWB is being used as the predominant resource within the lesson.
- ❖ However, practitioners suggest that it is hard to make assessments of individual pupil progress and even more challenging to evidence this if they have not prepared an individual activity for the pupils.
- ❖ One of the key areas of learning and teaching which can be further developed is the role of questioning within the classroom. Throughout this project, during interviews and within feedback after the observations, we have worked with the schools to consider what types of questions are being asked in the classroom. As one teacher commented: "I have never thought about this before, I don't even think about the questions I am asking, I have never planned them." This is certainly an area that could be developed as part of future research.
- ❖ Alongside this is the role of dialogue and discussion. These are all areas which can be researched by individuals, but also within schools and regional authorities.
- ❖ Practitioners do need to record or log details of what they have been doing within lessons to avoid repetition or duplication.
- ❖ Practitioners should not feel the need to assess every activity. Assessment can be by questioning, task activity or outcome.
- ❖ There is a gap between what is provided and how it is used. The practitioner has expectations of the IWB, but these are soon shattered if the technology does not enable him/her to achieve.

- ❖ It is not just a matter of moving through the IWB software to get to the next activity, the practitioner should be constantly reviewing the success of the pupils and making assessments to inform teaching and learning.
- ❖ School communities have many decisions to make around their choice and deployment of interactive whiteboard software. Following the successful installation of hardware, schools need to decide what type of computer will be connected to the IWB in their classrooms. Typically, this is either a laptop or desktop computer, with internet access. As installation companies do not always install the associated software and drivers onto the attached computer, this needs to sometimes be done afterwards by a technician, adviser or the teacher themselves. Most commercial suppliers provide a download service for their software and some also provide it on disc. Network and stand alone versions of the software may both be available; so, depending on the size of the school, the type of network and the number of IWBs, the programmes may be installed in different ways.
- ❖ Once the software is available for use on the attached computer and functioning correctly, there are several other issues to consider. Firstly, commercial suppliers regularly release updates and additional resources for their software. Often teachers are blocked from installing these updates as they do not possess administration rights for their network or computer. Where teachers do have administrator privileges, it can lead to a situation where some classes regularly update their software and others do not, this leading to a point where it is possible that teachers in the same school could be using different versions of the software, with different functionality and file types. If a network manager or technician is unaware of a change to the software or important update, then these can be left not installed for long periods. Sometimes resource galleries, from some commercial suppliers, are not installed or are installed incorrectly, as the technician or network manager fails to understand their significance in the teacher designing interactive lessons and activities. Sometimes it has been observed, in a small minority of cases, that these resources have been purposely not installed due to the amount of time involved in the process.
- ❖ A key driver in successfully beginning to use the IWB software is for the practitioner to be able to access the software outside normal lesson times. When preparing an activity or lesson in advance, it is highly unlikely that the teacher would do this on the interactive whiteboard at school. Most users would prefer to access the software from home or from an office during free periods in order to prepare activities. Where a teacher has a laptop with the software installed, that they can use for their professional duties and take home, it is much easier for them to develop the necessary skills and knowledge of the software. Where this is not possible, it is vital that practitioners are given home access to the IWB software so that they can install it on their own personal computer. However the home access is provided, it is also important that users think about how they will transport files and lesson materials. Practitioners use pen drives / memory sticks, some transport them via a portable hard-drive with others e-mailing themselves the files for a lesson and logging on to download them from the location of the lesson. More teachers are now able to access the school network remotely and can therefore save IWB files directly to a specific folder from wherever they are working to access later. IWB mature schools may also

have a mechanism for sharing lesson materials, practice and files between teachers and departments. This could include building an IWB lesson resource bank over time that is accessed and updated each term or year.

7. RESOURCES

1. To what extent are you able to make use of software that is available with the IWB?
2. How often do you create your own resources for the IWB?
3. What happens to resources (flipcharts/ notebooks/ workspaces) you create?
4. Are there any other educational resources that you regularly use in conjunction with IWBs? How are these used?
5. What content do practitioners want access to?
6. How do you share content that has been created by teachers/other practitioners?
7. How do colleagues share resources with you?
8. What do you think about resources created by suppliers including materials from on-line communities?
9. What other resources are needed?
10. What about copyright and intellectual property rights?

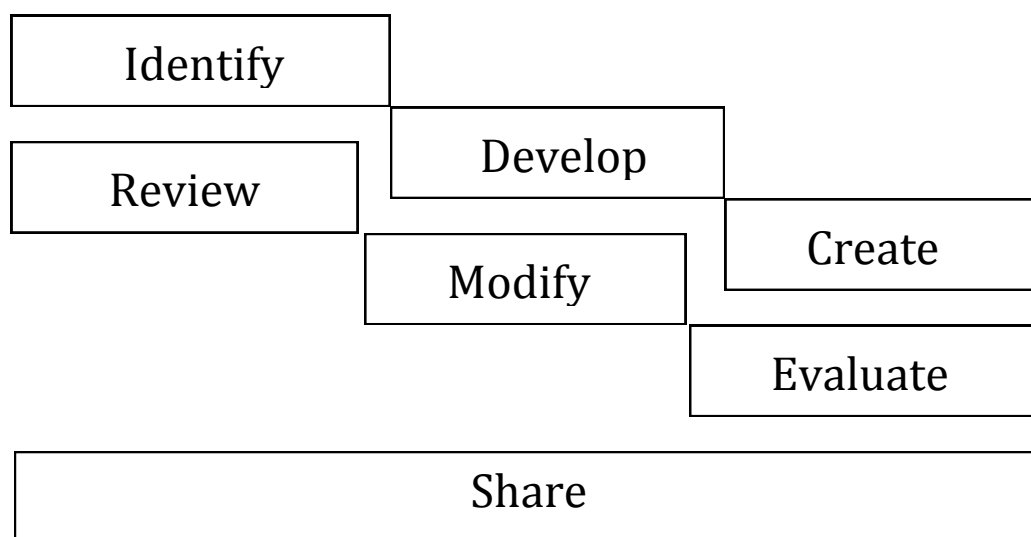
- ❖ New users of interactive whiteboards expect access to a full range of digital resources, but finding your way around these takes time. The questionnaire to practitioners and visits to schools has shown that practitioners do not always know what they have access to. A common problem is that practitioners do not know their way around the software provided within the interactive whiteboard. In some cases, the resources have not been fully installed and made available to the practitioner. One experienced user who was a secondary maths teacher was not aware of the maths resources which are readily available within the software.
- ❖ One of the biggest problems identified is that many teachers still continue to access the resources via their own laptop. This means that potentially each member of staff has access to different materials and stores completed resources in different places.
- ❖ The percentage of practitioners using other resources to work with the interactive whiteboards, for example individual devices such as voting systems or Learner Response Systems, is likely to grow over the next few years. The integration of other interactive devices needs to be planned.
- ❖ Teachers have responded positively to the use of lesson toolkits and templates that have been developed by some of the commercial suppliers. These are not whole lessons nor are they complete resources, but, by being able to adapt materials and link them directly to individual teacher's planning, these allow the teacher to spend less time having to create everything from the beginning. However, these do need to be used with caution, because some tasks would not be appropriate for every pupil within the class. It may require some additional input from the teacher to differentiate for the individual learning needs of the pupil.
- ❖ Regions should look to provide opportunities to create lesson resources collaboratively. Practitioners comment that they need time to develop materials that

are specific to their own subject. Commercial suppliers could look to facilitate 'content development' time.

- ❖ Schools should identify resource leaders who know how to create /develop their own resources and who can demonstrate new ways of teaching and learning. This could work as part of the proposed learning and teaching team.
- ❖ Resources need to be transferable, organised and understood and integrated with assessment.
- ❖ Practitioners are demanding more customisable resources where activities can be adapted and linked to many areas of the curriculum. The commercial supplier needs to create resources which are customisable.
- ❖ Identifying resources continues to be a growing challenge. Quantity and volume does not necessarily relate to quality. Some commercial suppliers offer their own online community, and even have areas on social networking sites. These are recognised as useful by practitioners because they provide lesson ideas, lesson materials and access to existing users and their practice. However, some users are concerned that not all materials have been reviewed and not all materials are suitable for every practitioner. The less experienced users still download and use these lessons without reviewing the content before use. Practitioners raise concerns that materials can rarely be used as they first appear.
- ❖ It has been suggested that commercial suppliers should look to develop peer review and comment systems. Teachers readily acknowledge that quality determines whether or not a resource can be used. Commercial suppliers should look for current practitioners to review existing materials that have been created by others. Indeed, there is also a ministerial responsibility to ensure that the quality of materials that are being shared.
- ❖ To some extent, this is also true of published resources, which are sometimes chosen to stimulate and motivate pupils. There is some evidence to discuss that some of the activities have not been fully linked to the curriculum and are not always appropriate to the specified age groups. Some published resources are also concerned with encouraging pupils to select the right answer, rather than allowing them to form their own opinion or ideas.
- ❖ Practitioners also identify that there is not always the opportunity to share resources. Many staff currently create resources in isolation and store these on their own laptop. Schools need to address where lesson materials are stored and should make provision through the Virtual Learning Environment. (VLE) Some schools have also found opportunities within staff meetings or professional development time for colleagues to share a resource, an activity or new skill.
- ❖ Staff and pupils should also have access to the software beyond the classroom in other areas of the school and at home. This means that pupils should be able to access the resources through the VLE.
- ❖ Across Europe, not all schools have reliable and secure internet access, but this is essential for the practitioner to be able to remain spontaneous. It is also appropriate

for head teachers and senior leaders to consider what firewalls are in place to prevent teachers and pupils accessing inappropriate information.

- ❖ The use of resources in a particular language continues to remain a barrier. Commercial suppliers have begun to address this according to need and demand from users within particular areas. Ministries should seek to agree the provision of specific resources as part of their agreed implementation plan with the commercial supplier. These resources have to be in place at the point of purchase. Commercial suppliers also need to know what other content or materials exist locally and can be readily used on the IWB.
- ❖ This might include knowledge of regional groups or partnerships which could support practitioners to make best use of the technology.
- ❖ It is strongly recommended that IWB software is networked. This means that staff can access materials, but upgrades can be done more routinely.
- ❖ Staff can also access the software outside their teaching hours to be able to plan and develop ideas.
- ❖ Practitioners should not forget the value of concrete resources. Whilst lessons come to life using the visual content on the IWB, pupils also benefit from being able to handle objects. For example, the IWB has pictures of money, but practitioners recognise that pupils benefit when they can see, touch and hold real coins.
- ❖ Practitioners may find it helpful to think and plan through the following steps when selecting resources for the IWB.



- ❖ Practitioners like to be able to access other resources alongside the IWB. In the survey, respondents confirmed that they continue to make access of large dry wipe boards and small wipe boards within the classroom. There is also evidence of teachers using voting systems or learner response systems (LRS), slates, remote tablets, visualisers, document cameras, wands, netbooks, wireless mouse, microphones and video conferencing equipment. Only two respondents said that

they had used mobile phones with the IWB. The notion of individual student devices being used with the IWB is a key area to be explored further.

- ❖ Copyright/Intellectual Property Rights do need to be considered by the teacher before sharing resources. Teachers should look to add Creative Commons' licences to resources that are being uploaded to communities or virtual learning environments. Links to websites which outline the issues are available on page 66 of this report.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

At the beginning of this millennium in the UK, IWB were the catalyst for the change of delivery of ICT in schools. A direct financial investment and a strategic approach from national and regional projects soon led the UK to confirm that the IWB is an essential tool for teaching and learning, but it will not transform practice in isolation.

Communities of practice have flourished, not just in the UK but in several European countries, and there is a greater awareness from the commercial suppliers that IWBs have to meet the demands of the C21st classroom. This report will help to highlight how IWB users can now benefit from this understanding whilst realising that general advances are greatly improved not only in hardware, but also in terms of internet connection and access to web based materials. The IWB is a growing expectation within classrooms at primary and secondary level. The next step is for schools to address how they can personalise learning more effectively by linking whole class technologies with individual student devices.

In many respects, this enables those countries that are in the embryonic stages of adopting IWB technology to acknowledge from the outset that this is something which needs to be implemented across the school and embedded within learning, teaching and assessment. It also serves to remind practitioners that we cannot become complacent about remaining current with training and professional development. It requires commitment from the school leadership. It is only then that the technology will become fully integrated.

THIS RESEARCH BEGAN WITH THREE KEY QUESTIONS:

1. What are the key areas of focus for schools implementing the use of IWB?
2. What do schools need to do to ensure the effective use and application of this technology?
3. What can commercial suppliers do to improve the use of IWB?

The research began with a survey which was distributed by the European Schoolnet IWB working group to many practitioners. This was followed by link research visits, observations, interviews and focus groups within four countries: Ireland, Italy, Portugal and the UK. This data was collated and the analysis of the project team has led us to define seven themes for schools to work with when implementing this technology.

These themes need to be constantly revisited and the key decision makers leading the implementation and integration of the technology need to be able to empower others to manage the effective use and application of this technology.

- ❖ The sharing of practice should be regular and planned, encouraging all practitioners to contribute. Communities of practice need to be developed at a regional, national and international level. This should provide opportunities to meet face to face and collaborate in a virtual workspace.

- ❖ Schools need to define their own roadmap for technology. Schools should have a CPD plan and the training for the IWB should be embedded within this.
- ❖ Schools can develop learning and teaching teams, defining roles and responsibilities which embraces how IWB meshes seamlessly in with whole school developments. This team can co-ordinate access to appropriate training, resources and opportunities to observe practice and work collaboratively within lessons.
- ❖ Speaking to so many practitioners who have worked in isolation within their school over the years, one of the key recommendations for all ministries who are new to the use of this technology is that an initial installation within a school should always be a minimum of two. This will allow at least two staff to work together, preferably within one department or year group to share ideas, develop content and promote the use of the technology beyond one area. The IWB should be the same brand across the school.
- ❖ Schools should acknowledge that all staff have the right to appropriate training and CPD, but this is only valuable if access to the IWB technology is regular.
- ❖ There are still too many examples of ‘missioners’ (Glover et al 2005) or ICT champions in schools and it is time to move on.
- ❖ Practitioners should seek the opportunity to observe practice on a regular basis.
- ❖ Practitioners should explore the types of questions they are asking in the classroom and consider how the activities are challenging individual pupils when using whole class technologies. This includes the paper-based tasks that pupils are given to do within a lesson.
- ❖ Practitioners should explore how they are using other resources to enrich pupil learning.
- ❖ Practitioners need to take responsibility for their training and long term CPD that they need to use the IWB. This includes knowledge of the general uses, tools, techniques and applications. It also includes knowledge of where to store files, organise lesson materials and locate resources.
- ❖ Commercial suppliers can work with ministries to ensure that training and CPD is provided as part of the initial specification with ministries. The implementation of IWB technology goes far beyond the provision of hardware.
- ❖ Commercial suppliers should seek to provide access to more subject specific training. This needs to involve the professional development of advisers at a regional level.
- ❖ Commercial suppliers should look to provide training for technicians and technical support so that schools are self-supporting and remain current with their knowledge of software versions, interactive devices and resources.
- ❖ Commercial suppliers should recognise that content now has to be customisable; practitioners should not be bound by the technology, but enabled. Teachers do want to take ownership of their teaching materials, but the IWB software can sometimes be restrictive as it demands knowledge of advanced skills to achieve professional

outcomes. There is a clear future for 'templates' and 'toolkits' which scaffold learning objects.

- ❖ Commercial suppliers should make practitioners, pupils and parents more aware of how the IWB software can be accessed beyond the school day. This will encourage pupils to access materials beyond the lesson and develop the ability for the teacher to be able to share pupil work.
- ❖ Health issues have been raised within the European Schoolnet IWB case studies, but not within evidence collated as part of the EuSCRIBE Project. This is perhaps because we worked with keen adopters and no problems had been encountered which indicated health issues. However, ministries cannot afford to completely ignore some of the issues that have been raised. Commercial suppliers should offer guidance about how to address health and safety matters. This should also include guidance to schools about e-safety.

RECOMMENDATIONS

This project has shown that there are a significant number of practitioners across Europe who are seeking to move forward with IWB technology. There is a clear need for further research at a national and European level to ensure that schools know how to embed the technology within every classroom.

1. The EuSCRIBE Project recommends that Ministries in the European Schoolnet IWB Working Group look to work with commercial suppliers to develop testbeds across Europe for interactive whiteboards and other interactive devices. This could also include consideration of alternative technologies.
2. The EuSCRIBE Project recommends that Ministries in the European Schoolnet IWB Working Group look to award funding to advisers at a regional level to co-ordinate development projects. This would allow leaders to undertake research and demonstrate the benefits of working in partnership and collaboration to show exemplary practice.
3. The EuSCRIBE Project recommends that Ministries in the European Schoolnet Interactive Whiteboard Working Group look to award funding for EU Scholarships for whole school development.
4. The EuSCRIBE Project recommends that Ministries in the European Schoolnet Interactive Whiteboard Working Group look to award funding to EU practitioners who can undertake research and development within their own classroom.
5. The EuSCRIBE Project recommends that a European conference is organised to share practice and consider future steps for development for schools and classrooms. This project has attracted international interest as other countries beyond Europe are keen to embrace IWB and need guidelines to inform schools. There are leading schools that could learn much from each other.

Finally, time remains the biggest barrier to the use of the IWB. This is a long-term development, but it needs short term, realistic goals. The use of the IWB has to be embedded within school improvement. We hope that all readers will be able to take these seven themes forward as a foundation within their own work. It can undoubtedly be expanded and adapted to embrace your own individual circumstances.

We wish you every success on your journey!

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WEBSITES

EUROPEAN SCHOOLNET

<http://moe.eun.org/web/iwbworkinggroup/iwb> Interactive Whiteboard Working Group

<http://lreforschools.eun.org> The Learning Resource Exchange for schools

CZECH REPUBLIC

<http://dum.rvp.cz> - Portal for sharing various digital resources, part of the LRE

<http://www.veskole.cz> - Mostly frequented portal for interactive LOs (school administered)

<http://www.dzs.cz> European Cooperation in Education

<http://www.rvp.cz> - Czech curriculum portal including national repository of digital learning materials

ITALY

<http://www.scuola-digitale.it> ANSAS IWB dedicated website

<http://wiidea.scuole.bo.it> The italian WiiMote teachers 'community

PORTUGAL

<http://moodle.crie.min-edu.pt/course/view.php?id=396> Interactive Whiteboards at the Team for Educational and Technology Resources Moodle platform

https://www.portaldasescolas.pt/portal/server.pt/community/00_recursoeducativos/ Schools' Portal, Portuguese Ministry of Education, Learning Resources section

UK

<http://www.becta.org.uk> British Educational Communications and Technology Agency

<http://www.teachers.tv/> (The homepage for Teacher TV – Many references to IWB use if used as a search term)

<http://www.teachernet.gov.uk/wholeschool/ictis/infrastructure/iwb> Advice and guidance on using IWBs in different areas of the curriculum

<http://t-media.educ.cam.ac.uk/T-Media-Mathematics/start.html>

COPYRIGHT LINKS

<http://creativecommons.org/about/> information on Creative Commons licenses

<http://www.copyrightaware.co.uk> Industry Trust advice on copyright

<http://jisc-casper.org/content/view/about> Copyright advice and support project for e-learning resources

LINKS OF COMMERCIAL IWB SUPPLIERS THAT SUPPORTED THIS STUDY

<http://www.einstruction.eu> The EMEA eInstruction website

<http://www.einstruction.com> The official eInstruction website

<https://www.eicomunity.com> The eIcommunity - user group for eInstruction

<http://mimio.dymo.com> The official Mimio website

<http://www.mimioconnect.com> The Mimio user community and lesson bank

<http://www.prometheanlearning.com> Promethean Training and Online Learning Hub

<http://www.prometheanplanet.com> Promethean user community

<http://www.prometheanworld.com> The Official Promethean website

<http://smarttech.com/> The official SMART website

<http://www.exchange.smarttech.com/index.html> SMART online user community and resource exchange

APPENDIX I: KEY THEMES DISCUSSION TEMPLATE

Commercial Suppliers	Training	Leadership	Learning and Teaching	
Purchase/Maintenance/Installation	Classroom Management and Organisation		Questioning	Personalising Learning
Technical	Resources – including other interactive devices		Pupil Perspective	Data and Assessment
Access	Digital Content – including development of Communities of Practice			
			Evidence/Research/Case Study Materials/References	
Other areas for consideration				

EuSCRIBE Project 2010 – Key Themes Discussion Template

This document can be enlarged and used to guide discussion groups when planning for the implementation of IWB technology.

APPENDIX II: EUSCRIBE PROJECT LESSON

OBSERVATION RECORD (FOR USE WITH LESSON USING IWB)

School:		
Country:		Area/Locality:
Date:	Yr Group:	No. of Students:
Lesson Focus:		
Observer Name:		Practitioner Name:
Classroom Layout (sketch): Include location of IWB and computer		
Resources		Other Interactive Devices e.g visualiser, Learner Response System
Digital Resources (including key IWB software)		

APPENDIX II: EUSCRIBE PROJECT LESSON

OBSERVATION RECORD (FOR USE WITH LESSON USING IWB)

Lesson Section and Content	Specific IWB Use
Lesson Objectives	
Starter Activity	Teacher:
	Pupils:
Main Activity	Teacher:
	Pupils:
Plenary	Teacher:
	Pupils:

APPENDIX II: EUSCRIBE PROJECT LESSON

OBSERVATION RECORD (FOR USE WITH LESSON USING IWB)

Key Activities – within and beyond the lesson												
Planning and Preparation												
Access to/Storage and Saving of Work												
Assessment/Data												
Key Questions												
Timing	5	10	15	20	25	30	35	40	45	50	55	60
IWB Used												
Starter												
Main Activity												
Plenary												

APPENDIX II: EUSCRIBE PROJECT LESSON

OBSERVATION RECORD (FOR USE WITH LESSON USING IWB)

Uses, Tools and Techniques					
General Uses					
Play DVD		Play Video Clip		Play Sound	View/Interact with website
Use Third Party Software		Video Conferencing		Presentation/ Powerpoint	Examining Still Images
Share Electronic Files		Share Pupil Work		Using IWB Software	Brainstorming Note-taking
Annotation		IWB Software Over Desktop		Other	Other
Using Content					
Built in Content Template Pages		Built in Flash Content		Commercial IWB Content	Content from Manufacturer
Downloaded Lesson Content		National/Local Government Content		Other	Other
Tools and Applications					
Pens		Highlighters		Blinds/Spotlights	Handwriting Recognition
Camera Tool		Timers		Maths Tools e.g. protractor	Screen Recorder Sound Recorder
Split Screen		Magnifier		Other	Other
Techniques					
Grouping		Layering		Rub and Reveal	Fill Revealing
Object Actions		Infinite Copying		Matching e.g. Snap back	Matching e.g. Connectors
Links Embedding Media		Text Manipulation		Drag and Drop	Media Storyboarding
Transparency		Animation		Other	Other
Other Notes for Discussion with Practitioner					