Teachers and Interactive Whiteboards: accessing, creating, sharing and storing resources within a school community

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Abstract

The recent trend to equip Australian classrooms with IWBs is having an impact on teacher behaviour. This study looked at how teachers access digital resources for the implementation of the IWB, as well as how they could be better assisted to access IWB resources.

The results from a survey administered to all fulltime classroom teachers in the school, and five in-depth interviews suggested that when an IWB is placed in a classroom the teacher is motivated to find resources which are specific to the needs of the children and the curriculum requirements. Most often teachers will search the internet to find digital resources, while more skilled ICT users are likely to create their own resources, and teachers with a range of ICT skills will also rely upon other teachers and professional development days to access IWB resources. Typical barriers to IWB implementation in this study were the ability to access appropriate digital resources, and the technical issues which appeared to mount up over time. When the IWBs were implemented in this school the only type of professional development available to teachers was related to the software installed on the IWBs.

Although these teachers were sharing their IWB resources, there was no one method for storing or sharing digital resources currently being used which could be implemented across the school community. The teachers developed a number of ideas for storing and sharing their IWB resources within the school in the future.

These results suggest that as the way teachers access digital resources is idiosyncratic to the teacher, supporting them may require a variety of initiatives. It is recommended that when schools implement IWBs they consider how they expect teachers to access the digital resources necessary to implement the IWB, and monitor the number of technical issues.
It appears that without systematic assistance from a relevant authority schools are finding their own way through implementing the IWB, and may not have access to the type of information necessary to achieve the potential of the IWB. Targeted advice for schools on the implementation of the IWB seems to be overdue.

Two positive impacts of IWB implementation found in this study related to the relatively high levels of teacher ICT confidence which may be the result of the day to day interaction with technology that IWB use entails, and the creation of a community of sharing which could be related to the common curriculum and the teacher’s shared learning journey when IWBs are implemented.
Declaration

This is to say that

i. the thesis comprises only my original work towards the MITEd,

ii. due acknowledgement has been made in the text to all other material used,

iii. the thesis is less than 20,000 words in length, exclusive of tables, maps, bibliographies and appendices

Philippa Elizabeth Ross

Signed ____________________________

Date _____________________________
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Chapter 1

Introduction

Walking down the corridor one day while working in a school I was privy to an exchange between teachers unlike any interaction I had previously witnessed.

'w w w parcel it up. Great for 3D shape nets. Have a look. I found it last night', said one teacher to another.

And that was it. They passed by each other and continued in opposite directions. What was the meaning of this exchange and why had both teachers acted like all the necessary information had been conveyed?

It was with slow dawning surprise that I realised these teachers were sharing Interactive Whiteboard resources. What had created a situation where these relatively unskilled ICT users were engaged in hallway conversations, enthusiastically exchanging ICT resources? What had motivated this desire to find digital resources, and what skills would these teachers need to successfully access resources?

The problem

This thesis was inspired by this exchange. It was the implementation of the Interactive Whiteboard (IWB) which had created the motivation for these teachers to want access to a range of suitable digital resources. This project set out to understand what was happening for these teachers at a school level.

As a relief teacher with an interest in ICT it is not uncommon to listen to long winded staffroom conversations about the problems associated with using ICT in the classroom. So this apparent change in motivation, whereby classroom teachers appeared to be engaged by the task of discovering new digital resources, was an instant fascination for me.
What was the plan schools were enacting when they placed IWBs in schools, and what were the expectations for the teachers? Do schools understand the impact that implementing IWBs might have on teacher behaviour, and how are they equipping their teachers to ensure that they can successfully access digital resources for their IWBs? These questions intrigued me and were the initial motivation for the current study. In time these questions became focused on understanding not only how teachers accessed digital resources for their IWBs, but also how they could be better assisted in this process at the school level.

The implementation of IWBs has been a relatively recent endeavour in Australian schools and although much research is being focused upon the narrative of their introduction, there is a need to understand how teachers implement the IWB in their classrooms, and the expectations being placed on individual teachers to successfully locate their own curriculum relevant IWB resources.

With this project it is hoped to inform the debate on the implementation of new technologies in general, as well as help school planners to understand the types of activities teachers will undertake when an IWB is placed in their classroom. With this information school planners might be able to better assist teachers at a school level, and develop plans for the ongoing implementation of the IWB based upon an understanding of teacher behaviour.

**Statement of aims**

This study set out to research the ways in which teachers access digital resources when implementing the IWB. This included looking at how teachers find and create resources, the role that professional development plays in this process, and any factors impacting on a teacher’s ability to access IWB resources. The factors considered in this study were first identified in the BECTA (2004) report looking into the barriers to the uptake of ICT by teachers.

In addition to investigating the process these teachers undertake to access digital resources, it was hoped to positively impact upon the school environment by helping
the teachers to develop a plan to improve access to digital resources. This part of the research focused on how teachers currently store their IWB resources, the ways that they share these resources with other teachers, and how the teachers would recommend storing and sharing these resources across the whole school community.

**Limitations**

When implementing new technologies there are a wide range of implications for school planners, individual teachers, technical support staff, as well as infrastructure issues, and in this case the implications for classroom pedagogy. Although these issues all have an impact when implementing the IWB, for the purposes of the current research it was decided to limit the scope of the research to focus on teacher behaviour, in terms of access to digital resources for the IWB. Many of these areas were encompassed within the research, but by targeting one specific area a thorough investigation of the topic was possible.

This study is also limited by the fact that I am a sole researcher working within the requirements of the current degree.

**Overview**

To effectively investigate this topic this dissertation first examines the literature that surrounds the implementation of the IWB in Chapter 2, and in particular focuses on the background to the use of IWBs in the classroom. The theme present in much of the literature regarding the positive impact of IWB implementation is discussed, as well as the many understandings which can be gained from the wide variety of research addressing current IWB implementation in both Australia and the UK.

Chapter 3 presents the methodology behind the development of this study, and begins by looking at the two methods of data collection, which involved a self administered survey and individual interviews. The way that the two stages of data sampling were conducted and then integrated is explored, with reasons for the emphasis on the understandings gained from the interview data.
Many fascinating insights are presented in Chapter 4 as the voice of each teacher shines through in the presentation of data. The results from the survey help to demonstrate a number of findings that are gained from all 20 full-time classroom teachers in the school. This leads into an interview with the school Principal which was included to better understand the role of the Department of Education and Early Childhood Development (DEECD) and school planners in IWB implementation in this school. Finally, the interviews with five individual teachers come to light in a tapestry of quotes and observations that hopefully will enable readers to briefly be touched by their stories.

The results from the survey and the interviews are drawn together in Chapter 5 under the headings of the research questions, initially focusing on how teachers access their digital resources. This chapter examines the types of factors which can adversely affect a teacher’s ability to access resources, and impact of professional development on this process. The results were also used to create a picture of how the teachers store and share resources, and how they would recommend sharing digital resources across the school environment.

A concluding chapter considers how to place these findings within the context of the literature on IWB implementation, and the wider context of the school community.
Chapter 2

Literature Review

This chapter presents a review of the literature surrounding the use of IWBs in the classroom in order to understand the many factors involved in the implementation of IWBs in Australian classrooms. Initially this investigation looks at the background to IWB installation, as well as recent findings and their implications. This leads into a focus on teacher access to digital resources, the impact of other factors, the effects of professional development and the practice of sharing and storing digital resources.

Although recent research looks at the many perceived benefits of placing an IWB in the classroom, there is little research focusing on teacher behaviour when implementing IWBs, or how schools could be guided through the IWB implementation process.

Background

Implementation of IWBs in the classrooms began in the UK, with both the Welsh and English governments investing ten million pounds to ensure that all primary schools had access to IWB technology (Beauchamp, 2004; Somekh et al., 2007). This implementation was part of government policy, and was accompanied by funded professional development and the roll out of a National Whiteboard Network website to provide access to quality digital resources (Somekh et al., 2007).

In Australia a range of government initiatives have enabled primary schools to invest in IWBs. The New South Wales (NSW) State Government has announced that it will be providing every NSW public school with IWB facilities by 2011 (Bennett & Lockyer, 2008). In South Australia many schools have used the Federal Government’s ‘Investing in Our Schools’ initiative between 2005 and 2007 to fund the purchase of IWBs (Sweeney, 2008). The Federal Government of Australia from 2007 to 2010 also pledged to increase the expenditure on ICT in schools (Jamieson-Proctor & Finger, 2008).
Current research

Much has been written recently that attempts to understand why ICT integration has not necessarily achieved the expected positive results. Jamieson-Proctor and Finger (2008) saw the need to unpack the factors that affect ICT integration in schools, and investigate why the potential of ICT is not being reached. Cartwright and Hammond (2007) felt that new ICT was having little impact on teaching and learning in schools, which was leading to an interest in the factors that were affecting teachers in their integration of ICT into their classrooms. Way and Webb (2007) questioned why ICT was not being integrated into the curriculum and why teachers were reluctant to do this. They felt that a comprehensive picture of what was happening in schools was elusive, despite the fact this could provide valuable information for future planning.

Research focusing on the use of IWBs however, paints a reasonably positive picture regarding the uptake of this new technology. Somekh et al (2005) found that more teacher-researchers focused their study upon the use of IWBs than any other ICT related area, which the authors felt demonstrated their interest in the IWBs’ potential.

A BECTA (2003) report that summarised what the literature said about IWBs named a wide variety of advantages associated with equipping a classroom with an IWB. Along with increased student engagement and the ability to facilitate interactive teaching, the report noted the possibility of integrating web based materials into whole class teaching, as well as a more dynamic and varied use of digital resources.

The more recent publication of a large scale investigation into the substantial investment by the UK Government in the Primary Schools Whiteboard Project has for the first time shown that IWBs can have a positive effect on student attainment where no other ICT implementation has had such an effect (Lewin, Scrimshaw, Somekh, & Haldane, 2009). Much promise regarding the potential of IWBs in the classroom is beginning to emerge in the literature.

Bennett and Lockyer (2008) conducted a case study looking at the integration of IWBs into four Australian primary school classrooms. They felt that IWBs were gaining momentum in Australia and found a high level of acceptance of this new
technology by teachers in their cohort. They concluded that the many initial perceived benefits of using the IWB had translated into the good levels of uptake. Bennett and Lockyer noted that the main impact on teaching was the increased use of the internet and digital resources. The teachers in their study felt that the IWB brought technology into the classroom in a way other technologies had not.

Erikson, Grant and Peat (2006) in their research conducted in a suburban Melbourne school charted the course of the introduction of IWBs from student and teacher perspectives. They named the main perceived benefits of the IWBs as being: better lesson delivery, enhanced opportunities for collaborative learning in the classroom and the ability to cater for different learning styles.

**Implications for future research**

Many studies talk of the need for research to focus on how schools can be assisted in their ICT implementation. Glover, Miller, Averis and Door (2005) in their review of the literature regarding IWBs noted that much initial work revolved around individual narratives associated with introducing IWB technology into the classroom and that there was room for more empirical research.

Another BECTA report (2004) looking at the barriers to the uptake of ICT by teachers recommended that further research look into the barriers and enablers affecting current technologies, for example the IWB, in order to provide targeted advice to schools on how to increase technology usage. They felt it would then be possible to overcome any barriers to their usage and trial possible interventions for increased ICT use.

Sweeney (2008) looked at the IWB professional development needs for teachers, and felt that in Australia although schools were using government funding to purchase IWBs, there were no formal systematic initiatives to support their implementation. She stated that schools were calling for help to achieve the potential of IWBs, and saw a need for research that could identify what is constraining or aiding teachers to advance their ICT knowledge.
Access to digital resources

Although much of the research in this area focuses on the broader picture of IWB implementation, an analysis of this literature helps to shed light on how teachers are accessing digital resources for the IWB.

In the UK Somekh et al. (2007) conducted a large scale research project to evaluate the impact of IWBS in the classroom over a two year period. They found that the teachers felt the IWB acted as a portal to a wide range of digital resources, and that many teachers created or accessed their own resources. They reported that teachers enjoyed finding their resources from a Google search and then sharing their website recommendations with other teachers. To access a range of IWB resources teachers used the IWB manufacturer’s website, the National Whiteboard Network (NWN) website, other primary school websites, BECTA, and resources supplied by the advanced skills teachers in their school. Somekh et al. (2007) discovered that teachers tended to have a bank of their favourite resources or websites. Some schools in the project were good at sharing other teachers’ resources, through the NWN, or local pyramid groups and liaisons.

Teachers in the study were keen to spend time searching for resources that were specific to their needs and their group of children, and stated that easy modifiability was a key feature for acceptable resources (Somekh et al., 2007). The researchers named these easily modifiable resources as the middle path between accessing ready made resources and creating their own from scratch. In general they felt that teachers were eclectic in their use of resources and more than willing to share their knowledge within the school.

An integral part of this evaluation of IWBS in English classrooms was to investigate who was made responsible for helping teachers to find digital resources. Somekh et al (2007) considered this topic to be a part of ‘Good Practice’. They found it was most often the ICT co-ordinator, or subject co-ordinator who identified websites and resources that were appropriate for their area and this was frequently done on an informal basis. A small percentage of schools had their technician gathering
information on useful sites. Some local authorities even expanded their own websites to give teachers access to the NWN website, as well as resources from other sources.

Murcia and McKenzie (2009) looked at the use of IWBs for improving literacy and numeracy in Western Australia and noted that over time teachers became reluctant to spend time searching for ready made internet resources. They found that teachers were frustrated by the amount of time it could take to find appropriate internet based resources and the variable quality of the online interactive materials. The teachers felt their time was better spent making their own digital resources.

In the UK implementation of the IWB, one of the major undertakings was to set up and develop a website of IWB resources (Somekh et al., 2007). The National Whiteboard Network (NWN) was funded by the UK government and aimed to link teachers to digital resources which had been quality assessed, and deemed appropriate for classroom use. Somekh et al (2007) found that the targeted portal to digital resources was not utilised as much as expected, despite stating that it was used by a large number of teachers and highly regarded. They were disappointed to discover that even after informing all schools of its availability, at the end of the two year project, only fifty percent of head teachers had visited the NWN website. They concluded that one of the problems for the NWN was that it was competing in a crowded marketplace against a wide range of well established digital resource providers.

An Australian study conducted by Hunter and Beveridge (2006) looking at IWBs and the effect on pedagogy in New South Wales (NSW) classrooms found that the government established website of digital resources was highly utilised. Their findings showed that digital resources needed to be easy to access, curriculum relevant and good quality. They felt that the educational portal which linked 19,000 digital resources to the school syllabus was valued because it connected teachers to quality resources, and by July 2007 this portal had received sixteen million hits (Kelley, Underwood, Potter, Hunter, & Beveridge, 2007).

The establishment of portals to link teachers to quality assured digital resources is also occurring in Canada and America. The E-learning Research and Assessment
Network in Canada, funded partly by the Canadian government, maintains a database of resources (Leacock & Nesbit, 2007). Here educators can browse for digital resources which have been reviewed by groups of teachers using a rubric specially created for digital learning objects. Their rubric was designed to empower teachers in the evaluation of digital resources and is now used as a teaching tool in two Canadian Universities for the evaluation of online learning materials. In the USA there is a push in some states to set up repositories of learning objects that have been formally reviewed (Leacock & Nesbit, 2007).

In Australia a set of digital resources was developed by the Learning Federation (2010). This set of web based resources was created with funding partly provided by the Australian Government, and can now be accessed through a link in local Education departments’ websites ("The Learning Federation," 2010). This portal is designed to make access to resources which have been quality assured easy for teachers, while also linking them to curriculum ideas.

In the state of Victoria a website called FUSE was created in July 2009 to enable teachers to “Find, Use and Share quality Education resources” (DEECD, 2009). One of the aims of FUSE is to connect teachers to quality assured teaching and learning resources which were created either by the Department of Education and Early Childhood Development, by Victorian Cultural institutions or by the Learning Federation. Links are provided through different curriculum areas, and teachers can upload their own files and set up a collection of resources. Although this website is only beginning to impact upon Schools, it does demonstrate an understanding by the relevant education department of the importance of linking teachers to quality assured digital resources.

**Factors impacting upon digital resource use**

The successful implementation of the IWB can be affected by a range of factors. A number of studies investigate the types of issues which can impact on ICT implementation in general, and more specifically on the implementation of the IWB.
In 2004 BECTA conducted a study to identify the common barriers to the uptake of ICT in schools, through an analysis of the literature and current teacher surveys. They found factors were often inter-related and included teacher ICT confidence, access to ICT, appropriate training, technical support, gender, the time to locate resources and access to resources. The first key finding in this report was that a very significant determinant of whether teachers were using technology was their level of ICT confidence. It even suggests that teachers with low levels of ICT confidence will go to great lengths to avoid using it. The second important finding was the close relationship between ICT confidence and a number of other barriers which were identified in the report. ICT confidence was affected by the amount of personal access to technology, the available technical support, and the available training. Further to this, it was recommended that schools organise their ICT resources to ensure the maximum access for all users, as this can also help to determine the levels of use.

The BECTA (2004) study went on to note that when teachers do not have access to quality ICT resources this can seriously limit what teachers can do in the classroom with ICT. The report makes the distinction between having sufficient access to ICT resources, and having access to quality ICT resources, and notes that bad design of ICT resources can also be a barrier to the uptake of ICT. It states that it is important for teachers to have adequate time to prepare and research resources for their lessons, and that this is particularly relevant when online or multimedia resources are used.

Another study which identified problems with access to quality ICT resources was conducted by Murcia and McKenzie (2009). The teachers in their study, although initially favouring the internet as a good source of resources, soon questioned whether it would be more time efficient to create their own resources. They stated that this was a direct result of the poor quality of online resources.

Handal, Handal, and Herrington (2006) in their research evaluating online mathematics resources identify the lack of pedagogy, poor layout and design features as the main barriers to using online mathematical resources. They evaluated 500 educational websites and commented on the diversity of online resources, the absence of accompanying teaching materials, and the lack of cohesion between resources even
on the one website. Handal et al (2006) worked to produce a simple practical tool which could empower teachers to identify quality resources when choosing from the varying online resources.

Two other factors investigated in the BECTA 2004 report looking at the uptake of ICT, were gender and age. In contrast to popular belief the report found that a teacher’s age did not affect their uptake of ICT, but gender could play a role, with some evidence that male teachers used ICT more frequently than females.

Erikson et al (2006) in their Melbourne based study investigating the impact of classroom implementation of IWBs also found that age did not impact on IWB use. They state that the level of teacher enthusiasm for the IWBs was the same for younger graduate teachers as it was for their more experienced counterparts.

The issue of gender came to light in Queensland research conducted by Jamieson-Proctor et al (2008) looking at teacher confidence and the effects on ICT use. In synthesising results from 2652 teacher surveys they found that males reported higher levels of ICT confidence and that this transferred into the students of male teachers having higher reported levels of ICT usage. One limitation of the report is that the findings were based upon anecdotal teacher reports and not on actual observations. They felt that as seventy percent of Australian teachers are female there is a need to understand why female teachers reported less ICT confidence, and how their levels of confidence could be increased.

Just as ICT confidence can have an impact on a teacher’s ICT use, Lewin et al (2009) note that one interesting outcome of the implementation of the IWB is that a teacher’s general ICT skills can improve. This was seen to be a result of the daily exposure to technology involved in implementing the IWB.

Further barriers to a teacher’s access to digital resources for the IWB are the more technical issues. In the Primary Schools Whiteboard Project the authors note how the need for good technical support goes from being an option to a necessity when teachers are using live resources in their lessons (Somekh et al., 2007). They note that the failure of the internet when using online resources is a serious disruption rather
than just a discouraging nuisance. Cartwright and Hammond (2007) also name the provision of good technical support as being pivotal in helping sustain ICT use.

Murcia and McKenzie (2009) discovered that the availability of good technical support was a significant issue in their study which looked at developing effective IWB pedagogies. Teachers experienced compatibility issues between technologies, which were exacerbated by a lack of collaboration between different sources of technical support. They note that the IWB relies upon the connection of a range of different technologies and any problem with one component can make using the IWB impossible. They cite numerous occurrences where the wifi system would drop out, the laptops would not work and the IWB would fail to connect to other technologies. They feel that these issues all detract from the effective use of the IWBs. Somekh et al (2007) also note that this list can include the need for the IWB to be frequently recalibrated to the computer.

One worrying implication when teachers are faced with technical problems was noted in the BECTA 2004 report which stated that technical faults and a lack of technical support can lead to situations where teachers will avoid using technology as they develop a fear of recurring faults.

**Professional Development**

One consistent issue in much of the literature on the implementation of IWBs is the need for appropriate professional development. Phelps and Graham call professional development in ICT an ‘urgent educational imperative’ (2007, p. 15) in a report commissioned by the Queensland Society for IT in Education to develop guidelines for effective ICT professional development in schools.

The need to focus professional development on the needs of the individual, rather than the implementation of the technology, is explored by Knowles (2010). He feels that schools still consider implementation of new technology a success once they have overcome all the infrastructure barriers, and not by how users are empowered to do their jobs. Smith, Hardman and Higgins (2006) call this the ‘bottom up' approach,
where professional development related to the implementation of IWBs relies upon teacher self evaluation. They see this as leading to teachers continuing to refine their practice in collaboration with their colleagues.

Murcia and McKenzie (2009), who describe the process of integrating IWBs into teaching practice in a Western Australian school, feel that having professional development at the point of need can not be overstated. They state that teachers need to have some control over their own learning and access to activities that match their individual learning needs. Interestingly, they also promote the need for time to be set aside for teachers to be able to collaborate with their colleagues.

Haldane (2008) in her study on developing teachers’ effectiveness using the IWB saw the need for learning to be available when a need arose, and that skills training and support must develop at the pace of the individual learner. Amongst her many recommendations Haldane feels that the stimulation of learning communities within educational establishments is the best design for professional development.

There appears to be no consensus on how professional development associated with the installation of IWBs should be conducted, although a number of studies do suggest the need to incorporate a pedagogical element. Cartwright and Hammond (2007) note the need for professional development to not only address the technical skills necessary for operating the new equipment, but to include the modelling of curriculum practice. Other studies note the importance of incorporating a pedagogical element to IWB training (BECTA, 2004; Serow & Callingham, 2008; Somekh et al., 2007).

Glover et al (2005), Higgins, Beauchamp and Miller (2007), Kennewell and Beauchamp (2007), and Vincent and Jones (2008) all note the potential for the IWB to support a more interactive teaching style. Higgins et al (2007) in fact feel that to fully utilise the interactive features available with an IWB, teachers must adapt an interactive pedagogy. Thus for teachers to fully achieve the potential of the IWB it may be necessary to have access to professional development that addresses pedagogical issues.
Erikson et al (2006) state that when implementing the IWB there is a need for increasing pedagogical knowledge along with an improvement in technical skills so that it is possible to exploit the potential of the IWB. Jamieson-Proctor et al (2008) see the importance of ensuring that professional development focuses on the transformational potential of ICT while Smith et al (2006) impress the need to support individual teacher professional learning.

A report commissioned to evaluate the Primary Schools Whiteboard project (PSWP) in the UK found that after two years of using IWBs and with sufficient support, teachers had developed new pedagogic practices (Somekh et al., 2007). The authors thought part of the success of the project was that schools were able to be eclectic in how they used the training, which focused on changing pedagogy, thus enabling schools to adapt the training to their needs.

Lewin et al (2009), investigating the impact of the professional development in the PSWP, attributed part of this success to the common curriculum and relatively small size of the primary schools, along with the fact that all teachers were on a similar learning journey.

Vincent and Jones (2008) looked at a system of peer mentoring in an Australian secondary school which was effective in helping teachers to modify their teaching strategies. They felt that being able to exploit the possibilities of this new technology was greatly dependent upon access to peer mentors with the time to help the teachers plan, implement and reflect upon their lessons. Consistent with the UK research they found that a teacher’s pedagogy changed over time as they became more confident with the use of the IWB.

**Sharing and Storing digital resources**

In the current study it was important to establish how the teachers in the school shared and stored their IWB resources in order to understand the ways in which this process could be better facilitated within the school. The following section looks at the literature investigating the relationship between sharing and IWB implementation.
Research conducted at the University of Wollongong looked at the process of sharing digital resources among colleagues. Pennell (2007) established a digital repository to allow staff to share their digital resources through a system which could manage and deliver resources. The main aim of this process of sharing was to advance teaching. Pennell felt that part of the success of this project was the simple way in which staff could contribute and search for items through a system providing easy user interactions. Staff at the university involved in different small groups found that through this process of sharing they were learning from their colleagues’ experiences.

In the evaluation of the Primary Schools Whiteboard Network (PSWP), Somekh et al (2007) noted that there were a number of ways that teachers shared their digital resources. This list included:

- hard copy lists in the staff room
- electronically sharing on the school network
- links on the school website
- during formal meetings
- via email, staff newsletters, and through networking within their schools, and with other schools.

They felt that the IWB seemed to help create good sharing opportunities, and that teachers found they were sharing resources more than they had before the IWB was installed. This was partly attributed to the fact that all teachers were learning to use the IWB simultaneously.

While looking at how teachers were sharing their IWB digital resources Somekh et al (2007) also discovered that teachers were storing their IWB resources on the school server in personal or shared areas.

Lewin et al (2009) noted the development of a learning community when they investigated how the model of professional development had impacted upon the outcomes in the PSWP. They felt any implementation problems were soon overcome by the need to use the IWB and the mutual support of colleagues. Here, they found that a community of professional practice sprung up in most case study schools and
this helped to support the teachers through any implementation issues. The common curriculum of a primary school and its relatively small size seemed to foster these communities of practice, where members were all on a common learning journey.

Kennewell and Beauchamp (2007) noticed in their study of the affordances of the IWB that the teachers reported greater levels of sharing between colleagues, and that this was possibly related to the fact they were all in the same boat, sharing a common unfamiliarity with the technology.

This phenomenon was also addressed by Haldane (2008) when looking at the success factors associated with the implementation of IWBs. She feels that the stimulation of a learning community is the best way to provide professional development, and articulates the need for a school based solution dependent upon the identification of teachers’ needs coming from some form of learning community. Erikson and Grant (2007) in their study of IWB implementation commented on the benefits of a professional learning group. Here the authors noticed the importance of having a community of learners working together when introducing IWBs into the teaching regime.

Murcia and McKenzie (2009) felt that the learning community that emerged from their research project looking at using IWBs to improve literacy and numeracy in Australia, promoted a type of ‘techno-resilience’. This enabled the teachers in the study to appear to adapt to the changes more easily. They felt that in order to effectively use the IWB teachers have to be given the opportunity to collaborate, with time set aside for collegial collaboration, brainstorming and skills development. One teacher in the study commented that constructive collaboration time and support were imperative for the successful implementation of IWBs.

**Summary**

This review of the literature shows that while the UK implementation of the IWB was associated with government policy, professional development and access to a portal of digital resources, it seems that schools in Australia may have little access to
systematic assistance. Although there is limited information on exactly how a teacher behaves when an IWB is placed in their classroom, some studies suggest they use a wide range of sources for their IWB resources. A number of factors are identified in this literature as impacting on IWB implementation, but when considering the effect of professional development there is no consensus on how this could be conducted. Some studies suggest that in order to achieve the potential of the IWB teachers may need access to professional development that specifically targets pedagogical issues, as well as skills development. Interestingly, the literature presented here also suggests that IWB implementation may be linked to the establishment of sharing communities.
Chapter 3

Methodology

Introduction

This chapter presents a discussion of the case study methodology used in this study, which involved two types of data collection. The study was conducted in a mid-sized suburban primary school of 20 full-time classroom teachers and 424 pupils. The students in this school represented an average population in terms of socio-educational advantage, and were achieving good educational outcomes (ACARA, 2009). A survey, administered to all 20 full-time classroom teachers, and in-depth interviews with five staff members were used to investigate the teachers’ access to digital resources in the implementation of the Interactive Whiteboard (IWB) in the school.

Research Questions

The two research questions guiding this study are:

1) What are the ways in which teachers access digital resources for IWBs?

The investigation focused on three areas:

- how teachers find and create digital resources for the IWB
- other factors which could impact on the teacher access to IWB resources
- the role of professional development

2) How could teachers be supported in their access to digital resources for the IWB?

The investigation focused on:

- the ways teachers currently store and share their IWB resources
- what recommendations teachers make for storing and sharing IWB resources across the school community
Definitions

Two terms which are used extensively throughout this work and require a common understanding are:

1) Interactive Whiteboard - provides access to a large touch sensitive screen which can run interactive software, connect to the internet, show images or sound like a regular computer, but with the added advantage of being visible to the whole class (Somekh et al., 2007).

2) Digital Resources – refers to resources stored in a digital format and in this study may include information retrieved from the internet, lessons designed using software packages, or multimedia resources which are available as software programs in the school.

Setting

The first step in this study was to identify a sample, and the most important criterion in this process was to ensure that the school had implemented IWBs into every classroom. As Stake (1995) identifies, it is important to consider how to maximise the learning when choosing a case study sample, but this can lead to choosing the sample which is the most accessible. Choosing the school my children attended not only fulfilled the main criterion, but also meant that the sample was convenient and easily accessible. This, Creswell (2007) notes, has the advantage of saving time, money and effort.

This school appeared to represent an average population, with an enrolment of 426 students, and according to the government collected data on the My Schools website the student population was within the average range for socio-educational advantage (ACARA, 2009). Results for their student learning outcomes demonstrated that the school was above sixty percent of state government schools, with eighty percent of students achieving at or above expected levels in English and Mathematics.
The data collection was conducted in two stages. In the first stage a survey was conducted with all 20 full-time classroom teachers in the school, and in the second stage five volunteer teachers were interviewed. These five volunteers were recruited during a staff meeting in which the current study was presented. This was considered the maximum number for a single researcher to conduct an in-depth investigation within the scope of this project.

During the project one teacher retired before an interview was recorded, thus reducing the sample size to four. However, during interviews a number of teachers recommended the inclusion of another teacher, as they felt her work in accessing and creating IWB resources could be of interest. Although this teacher had not initially volunteered for the interviews, she happily joined the sample group after being approached, thus returning the sample size to five.

An attempt was made to include teachers in the interviews from a range of year levels. However, with only 17 teachers suitable for interviews (3 were excluded for ethical issues – see below) it was decided that having willing participants was more important than having a range of levels. This resulted in a bias towards the lower year levels as the sample included two prep teachers, a Grade 1 teacher, a Grade 2 teacher and one teacher who taught Grade 6 at the start of data collection and Grade 3 at the end. The teacher who changed levels was interviewed while she was teaching Grade 6, and participated in a follow up interview when she moved to Grade 3. While it is possible that the ways in which teachers in the lower grades access IWB resources might differ from the practices of teachers in the higher grade levels, there is nothing to suggest that this was the case.

The inclusion of five teachers in the in-depth interviews resulted in the generation of a large volume of data. This meant that the data had to be synthesised to choose the most pertinent information, which Merriam (1998) notes will limit its actual representation of the whole case. This synthesising becomes dependent upon the sensitivity or integrity of the investigator, and the attention to ethical considerations. To address this issue Grounded Theory (Corbin & Holt, 2005) was used to
systematically synthesise the large amounts of data, while consideration was also
given to the possibility of potential ethical issues.

The fact that my children attend the school in this study, creating a potential
dependent relationship with the teachers of my children, presented an ethical issue.
This was addressed by excluding these teachers from volunteering for interviews, but
not from completing the anonymous survey.

**Methodology**

This qualitative study was designed to reach a deep understanding of the ways in
which teachers access digital resources for the IWBs using an inductive approach. A
desire to fully consider the motivations and contributing factors of teacher behaviour
led to the use of the case study methodology. Its simple defining features described
by Merriam as a ‘rich, thick description of a phenomenon’ (2009, p. 43) fitted
perfectly with the current study. Merriam felt the important factors in a case study
were the desire to describe a particular phenomenon and its heuristic nature, and the
bringing of new meaning to the intended audience (Merriam, 1998). These factors
allowed for the kind of in-depth analysis of a population of teachers in one school that
this study required.

Merriam saw the most important or defining characteristic of a case study to be the
understanding of the case as a single entity which has boundaries. So the first step in
defining this research as a case study was to ensure that the phenomenon was
intrinsically bounded. Even when looking at the sample of one school, around which
a boundary is easily placed, it became necessary to further enclose this group to full-
time classroom teachers at the schools to ensure that the entire cohort had daily access
to an IWB. Thus a number of part-time teachers, and those teaching PE, Music, and
Art were excluded from the sample.

However this drawing of boundaries can become quite arbitrary. Stark and Torrance
(2005) point out that we cannot necessarily draw the boundaries around the school, in
this case, because what constitutes a school is influenced by the body of parents, and
much more pertinently to this study, the behaviour of teachers is influenced by decisions generated by government educational bodies. In an attempt to address these concerns I interviewed the school principal to identify government and/or school management decisions that might have impacted on the implementation of the IWBs in the school.

**Methods**

The first stage of data collection involved a survey administered to all full-time classroom teachers in the school. The purpose of the questionnaire was to gain an overall view of trends in teacher behaviour for the entire full-time classroom teaching population.

The survey design was appealing because it provided easy access to all full-time teachers in the school. Creswell (2009) sees the main advantage of the survey as its economical design and the rapid turnaround when collecting data. In this study the survey method provided a very economical method of collecting data, as the Principal allowed all teachers the chance to complete the survey during the staff meeting where this project was presented. Thus enabling what Creswell refers to as the singe stage sampling procedure where there is direct access to the population and all surveys are completed at one time.

Before the outset of the project I considered it was possible that only teachers with an interest or high skill level using technology would volunteer for in-depth interviews. One of the reasons for including a survey of all full time classroom teachers was to address this issue, and to gain understandings from a wider range of teachers. By including open-ended questions in the survey it was possible to collect more detailed responses from all 20 teachers in the school.

The second stage of data collection was the interviews. These were considered the best way to gather rich data, as Stake claims ‘the interview is the main road to multiple realities’ (1995, p. 64). I used the interviews to gain a greater understanding
of the personal experiences of the teachers, and to further develop the insights developed from the completed questionnaires.

All the interviews were conducted in one-on-one sessions, where it was considered important to provide a setting that made the teachers feel comfortable to speak and share ideas (Creswell, 2007). This was done by including teachers who had volunteered for interviews, and conducting the discussions in the teacher’s classroom. The classrooms also provided a level of privacy that would not be possible in other locations within the school. At one point during the interviews an attempt was made to conduct an interview in the staffroom. However, this made recording the interview problematic due to background noise and impacted upon the teacher’s ability to provide honest answers.

Rather than using specific questions during the interviews, a number of interview topics were developed. These were designed to maintain the flow of an interview, while allowing for questions to be adapted to particular circumstances. Keeping the topics broad and general can mean that it is possible to give the participants the opportunity to show how they construct their own meaning (Creswell, 2009). By roughly basing the interview topics on the questionnaire it was also possible for both the interviewer and interviewee to have an understanding of the topics to be covered prior to the commencement of the interview. Stake (1995) claims this can be important in framing the interview. It was also important to conduct follow up interviews once the analysis was underway so that any lingering questions or interpretations could be clarified with participants.

Mixed methods design principles were used to refine the way the two different methods of data collection were integrated and the weighting of importance assigned to each method. Greene, Kreider, and Mayer (2005) define a sequential explanatory strategy that involves the analysis of the survey data to inform the later interview stage. In the current study the questionnaire data, although being potentially insightful, was used to provide background and to inform the questions in the interview phase, as well as giving a wider understanding of the practices of all teachers in the school. Here the interview data carried the most weight, as it provided the greatest potential for obtaining multiple understandings. Thus the two stages were
separate but connected, making the design relatively straightforward to implement and report, but as Creswell (2009) notes, can increase the length of time involved.

The use of two methods of data collection also had the advantage that the overall strength of the findings was greater than if one method alone was used. Stake (2005) felt that the cross referencing of different data methods enabled the verification of data to clarify meanings as well as to consider multiple realities.

Where appropriate, recent findings from the literature were used to inform the structure of survey questions. For example, a BECTA report (2004) named a number of barriers to the uptake of ICT by teachers, and these were included in a question requiring teachers to rank the factors affecting their ICT usage.

**Data Analysis**

To analyse the collected data a statistical compilation of each question in the survey was used to determine the most popular answer and graphical representations of the data was incorporated into the results chapter. Simple column graphs were used to present data when the results were represented by total numbers, and pie charts were used when examining the results as a percentage of the total.

To assist with synthesising the large amount of data produced by this study a theory generating methodology called grounded theory was used (Corbin & Holt, 2005). Here the constructivist approach which acknowledges the multiple ways of interpreting data sets, as explained by Corbin and Holt (2005) was useful. Step one, called open coding, involved the development of concepts, which began with the first round of data collection, and involved deriving concepts from different data sources. There was an emphasis on alternating data analysis with data collection. Thus began an ongoing interaction with the data, constantly questioning and comparing sets of data and codes. At this stage data reduction, which allowed the data to be represented by a manageable number of concepts, and involved grouping concepts into categories, began. This is known as axial coding. Finally selective coding which involved selecting the most representative construct was commenced. Corbin and Holt (2005)
also espouse the importance of checking data analysis with participants, and in this project there was communication with the teachers after interviews were completed to discuss ongoing findings.

Validiy and Reliability

In this study an attempt was made to ensure the reliability and validity of the survey data by adhering to a number of principles of survey design (Lewin, 2005). The questions in the survey were designed to:
- be clear and simple
- avoid leading or double barrelled questions
- include all categories in multiple choice questions
- have clear instructions
- consider issues relating to the length and ease of completion.

Within the domain of qualitative research, Merriam (1998) concedes that there is no consensus on the criteria for assessing validity and reliability. In seeking internal validity, or how findings match reality, Merriam firstly advises the use of triangulation. This involves using multiple sources to confirm findings and/or multiple approaches to analysis, and can refer to the need to find additional interpretations rather than a single meaning (Stake, 1995). As this process uses up resources, including time and money, Stake feels that it is important to only triangulate the data which helps to clarify meaning. In this study the triangulation of data from two methods of data collection, as well as the inclusion of data from five different teachers’ perspectives, enabled the comparison of the findings from different data sources and the generation of different meanings, in each of the areas under investigation.

Methodological triangulation can also be used to strengthen the reliability of research findings, or the ability to replicate the findings. Reliability however is something that some conclude is impossible in qualitative research due to the unpredictable nature of human behaviour (Merriam, 1998). In this study an attempt was made to enhance the reliability of findings by what Merriam recommends as endeavouring to explain
researcher assumptions, and describing in detail how the study was completed and the results drawn.
Chapter 4

Results

Introduction

This chapter presents the stories shared by the teachers involved in this study. Initially the results gained from the collection of data using a self administered survey will be presented in the light of the aims of this study. Following on from this the case study results, which present the data collected from interviews with individual teachers, will be included. This section begins with an interview conducted with the school Principal to ascertain the impact of school planning and DEECD initiatives on IWB implementation.

Survey Results

To gain an initial understanding of how teachers accessed digital resources for their IWBs a survey was administered to all full-time classroom teachers in the sample school. These results were collected during one staff meeting where all relevant teachers completed the survey.

The results from the survey illustrated that teachers were using a range of sources for their IWB resources. Teachers were asked to select which of the 5 possible options they used to access digital resources (see Table 4-1 for a list of options), with a number of teachers selecting more that one option. Of the 20 teachers sampled 17 reported that they accessed resources from the internet and 17 relied upon other teachers in the school for their IWB resources (See Table 4-1). Access to resources from teacher professional development days was also popular (15 teachers), while 9 teachers relied upon teachers in other schools, and 5 teachers named professional groups as a source of IWB resources.
When these teachers were then asked which of these sources of digital resources was the most helpful different results were produced. A total of 9 teachers, or almost half of the sample, named searching the internet through the use of a search engine as the most helpful source of digital resources (see Table 4-2). 5 teachers named other teachers in their school, and 4 named other teachers in other schools as the most helpful source of digital resources, with a small proportion (2 teachers) finding teacher professional development days the most helpful. Thus it seemed that these teachers found the internet to be the most helpful source of digital resources, but also relied on other teachers in their school, teachers in other schools and professional development days.
Table 4-2: The most helpful source of Internet based teaching resources.

When investigating the impact of professional development on the teachers’ ability to find IWB resources it was discovered that three quarters of the fulltime classroom teachers had found IWB related professional development days to be of benefit to their teaching practice.

Accompanying the IWBs installed in this school was a software program, *Easiteach* (*Easiteach,* 2009). While exploring whether these teachers were using this software to access digital resources it was discovered that 80% of the teachers reported using features of the Easiteach software (See Table 4-3).

Table 4-3: Use of Easiteach software.
The survey investigated the impact of a number of factors, which were first identified in a BECTA (2004) report, on a teacher’s ability to access digital resources. The teachers were asked to rank these barriers, which can be seen in Table 4-4, on a scale from 1 to 6. The barrier with the lowest score indicates that many teachers assigned the barrier a lower ranking (i.e. 1, 2, 3) suggesting it is a significant barrier. The rankings given to each barrier by all the teachers were added together and the results show that the issue creating the most problems in relation to using ICT was the availability of technical support (See Table 4-4). The two other significant barriers were the time to locate resources and the availability of suitable training.

![Table 4-4: Barriers to the uptake of ICT rated on a score from 1-6. Note: In this table the greater the barrier the lower the score.](image)

In determining the impact of a range of influences on a teacher’s ability to access digital resources the current study also focused on the level of ICT confidence and its relationship to the number of years of teaching experience and gender. In the survey teachers were asked on a scale of 1-5 to rate their level of ICT confidence. The results showed that all teachers rated themselves between 2 and 4. 8 of the 20 teachers (or 40%) rated themselves a 4, 8 (40%) rated themselves a 3, and 4 teachers
(20%) rated their ICT confidence as 2 (See Table 4-5). Thus 80% of teachers rated themselves three or above, on a five point scale of ICT confidence. This shows a reasonably high level of confidence in using ICT.

As there were only three male teachers in the school and they were spread evenly across the different number of years of teaching experience, the sample was not large enough to infer any trends in relation to gender alone. When comparing the number of years of teaching experience with ICT confidence, we see that the average level of ICT confidence remains constant at 3 for all categories of teaching experience (See Table 4-6). This suggests that all teachers, whether they were new to teaching or experienced, and despite their gender, had similar levels of ICT confidence.
In the survey teachers were asked to recommend ways to assist them to access digital resources. Two possible responses were included in this question and many teachers chose the examples given. 9 teachers used the first example given and recommended using a centralised storage system of favoured resources, and 5 teachers used the example about creating a system of teacher sharing. Original ideas generated by the teachers ranged from placing a folder on the intranet, developing a website, creating a hard copy file, or using a formal system of teacher sharing. Some teachers also included other factors to be considered, for example, linking the resources to the local curriculum (VELS), and including brief descriptions or comments on resources.

**Summary**

A number of findings from these results which are worth noting include that:

- the teachers named the internet as the most helpful way of accessing digital resources but also relied on other teachers in their school, and other teachers in other schools, as well as professional development days
most teachers were using the Easiteach software which came with the IWBs
the biggest barrier was the availability of technical support, followed by the time to locate resources and the availability of suitable training
there was a relatively high level of ICT confidence across all levels of teaching experience
the teachers had many recommendations for assisting with the accessing of digital resources

Case Study Results

Five teachers volunteered to be involved in interviews regarding their access to digital resources for the IWB. These interviews were guided by a number of topics which included how they access, create, store and share digital resources for the IWB, and the impact of professional development or other factors on their access to digital resources. Focus was also given to how teacher felt they could be assisted in their access to digital resources. Each teacher’s story is presented in this chapter which begins with the interview conducted with the school Principal.

Dianne

The school Principal, Dianne, has a long term connection with the school which included having her own children attend the school. Upon entering the school in the morning, it is not unusual to find Dianne strolling the grounds and interacting with parents. She endeavours to make herself available to all members of the school community and appears willing to support any initiative that could be of benefit to the school.

Dianne stated that the implementation of IWBs within the school began after the school was involved in trialling new software for the Department of Education and Early Childhood Development (DEECD). At the completion of that project the school was given four IWBs which were chosen and purchased by the DEECD.
Teachers within the school were so impressed by these IWBs that they were purchased for all classrooms. Dianne said:

> From being involved in the Ultranet pilot the school was initially given one IWB then another three, or four altogether. Then other teachers saw these and wanted one, and so we bought them for all classrooms. We bought 16 more for classrooms and one portable one for the staffroom and library – this was all funded by the school. There were a number of acknowledged companies [named by the DEECD] that supplied IWBs to schools and we had to pick from those. The IWBs that we chose were just chosen to be consistent with the ones we had already been given.¹

Dianne felt that the DEECD provided assistance in the form of a list of potential suppliers of IWBs, but no specific guidance was supplied in terms of IWB implementation within the school.

Excluding the initial training in Easiteach (the software provided with the IWBs), conducted by the IWB supplier, Dianne felt there was little IWB professional development available. She noted that a number of schools in the local area had taken part in the software trial and had thus also received IWBs from the DEECD. When a common need for IWB related professional development occurred, one school decided to run workshops which other schools could attend. Here teachers had taken the stage and shared their most successful lessons incorporating IWB resources with their peers. Dianne said that ‘networks, school sharing and professional development has grown up around many schools implementing IWBs’.

The ICT policy within the school was very general and had not been adapted to specifically include IWBs or the accessing of IWB resources. Dianne said that the policy focused upon having teachers incorporating ICT into their teaching, with the ‘expectation that teachers incorporate IWBs into their current program of teaching’. She noted that teachers within the school were sharing resources, and that this seemed to be working well.

¹ All quotes are taken from direct transcription of the audio recorded interviews
Cathy

Cathy is a young teacher, relatively new to the school, who shows an interest in technology and displays a competence and awareness of the possibilities of using ICT. She is very positive about the introduction of the IWBs and felt their implementation has greatly expanded the types of resources she is using in the classroom. Cathy said:

There are always times when it is not working so you have to go back to teaching without it. But it wouldn’t be as fun, it wouldn’t be as interactive, it wouldn’t be as valuable I guess.

Before the installation of IWBs in her classroom Cathy felt that she had not explored the range of educational internet based resources. She is now using Google to find IWB resources, but finds it frustrating attempting to locate resources that meet the specific educational requirements of her classes. She relates a story where she once spent forty minutes looking for a specific maths resource, which she felt should have been easy to find, with no outcome. She said:

I was looking everywhere for an activity on arrays and I just couldn’t find one. You would think that would be quite a simple things to find but it wasn’t. I spent probably forty minutes looking for something. And it came up with array games… like tetrus … that is not what I wanted.

She noted that the key word she was using, ‘array’ was one that had a specific primary maths curriculum meaning, but also had a more general meaning when used in a google search. She discovered that ‘the trick is knowing the right keyword’.

Cathy found that looking for a high quality resource in a specific area could be problematic. She said that ‘there are lots of websites but some aren’t really that great’ and if ‘you want to find something that is a little bit better or have something specific’ there could be a problem. She said that her use of digital resources was ‘limited by the time it takes to research, but also by what’s available in the first 2-3 links that come up in a Google search’. Cathy found that often she did not have the time at the start of a unit to research internet based resources. She felt the time and effort
involved in finding resources was preventing her from using more digital resources, and she stated:

There are thousands and thousands of different interactive things on the internet. You just type in whatever you are teaching and that will come up, but when you are doing that – that is the time that you have to plan for and go searching for these things and sometimes it is hard to find what you want, exactly what you want.

She was beginning to question whether her time would be better spent developing some more digital resources of her own, despite acknowledging that this also required a large time commitment. Cathy had spent time developing her own resources using the available templates in Easiteach, using a PowerPoint presentation to provide a stimulus for new topics, or Word for text documents. Cathy was impressed by the PowerPoint slide another teacher, Hilary, had developed which would flash for 3 seconds each of the golden words children needed to learn. This was thought to cater for those children who needed to see a word many times before learning to read. Cathy did, however, remain motivated to searching the internet for resources because she thought there was such a wide range of resources available and there ‘was no need to reinvent the wheel’.

Cathy talked of the use of digital resources for the IWB which came with the Nelson maths curriculum books (Feely & Rogers, 2008). She had found these useful within the classroom but was concerned about the quality of the CDs, when one failed to work. Cathy had also collected a number of her own CDs containing digital resources she used in the classroom.

When asked about IWB related professional development Cathy said that she didn’t ‘need more training because I am quite technically advanced’. However, Cathy did feel she could expand her knowledge of quality resources for the IWB.

When discussing the barriers to using the IWB in her classroom Cathy had a number of issues. As the IWB was too high for the majority of her children to reach Cathy was not using the IWB during group work.

One thing I haven’t perfected with the whiteboard is, well using it all the time for all different things, but having small groups working on the whiteboard and that is
something that the placement of the whiteboard in the room is really quite important.
Now one thing with our whiteboards is they’re up too high.

She knew that other teachers were using a step to overcome this problem but as yet she had not had time to organise one for her classroom. She also felt that using the IWB relied upon a number of pieces of technology working and that this multiplied the number of possible problems. Cathy stated that:

One thing is that you always have to hope that it [the IWB] works on the day you want to use it, and the internet being up because you rely heavily on the connection to the internet, and the connection to your intranet as well.

Another problem Cathy discussed related to privacy. One of her examples regarded the drafting of a letter to the principal on her laptop, and illustrated how vigilant she needed to be about connecting and disconnecting from the IWB while files were open on her desktop. She commented that:

With my computer … I might be working on a letter to the principal during the day …it is so hard to make sure only the right information is displayed [on the IWB].
Always in the day I would plug and unplug it [her laptop] from the IWB to do my own work.

This added an extra layer of impracticality for her. She pointed out that the availability of an extra hard drive within the school had enabled another teacher to set this up as a dedicated computer for the IWB in her classroom. She felt this was preferable to using personal laptops with the IWB.

In storing her IWB resources Cathy was using bookmarking, but although she had attended professional development relating to online bookmarking she stated that ‘it has been blocked from our server … and we can’t get through to it’. As yet she had not found a way around this problem.

Cathy thought that sharing IWB resources on her year level was quite ‘ad hoc’. This meant that it was important for her that sharing was reciprocated. When studying African animals in her classroom, Cathy had a number of National Geographic CDs which she took to share with a colleague. She discovered that this teacher was using
the National Geographic website which had a larger range of resources that Cathy had not known about. She felt there was a problem with ‘other people finding great resources and keeping them to themselves’. She implied that she may be less prepared to share her resources in the future unless sharing was being reciprocated.

When considering how to store and share resources across the school community Cathy said that ‘some sort of databank storing resources would be very good’ and could assist teachers to find quality IWB resources linked to the curriculum. She saw this as a great advantage as she had once spent time looking on the internet for a resource to use with an ESL student placed in her class, only to discover that appropriate digital resources were being used in another classroom.

It was important for Cathy that this system use appropriate categories and headings to ensure finding resources was straightforward. She felt it was important that it be ‘on-line so that it can be accessed anywhere’ as she did most of her searching for resources from home. She felt that if the database was a website, then maintaining this would be time consuming and outside most of the teachers’ job descriptions. As she was new to the school, skilled in ICT and keen to become more involved in ICT developments, this statement became even more pertinent as she appeared to be the best placed in the school to perform this job.

**Carolyn**

Carolyn is a teacher with many years of teaching experience who now holds a senior role within the school. As a leading teacher she is both English Co-ordinator and Level 1 Co-ordinator. Carolyn appears to work to an efficient schedule, and although she was keen to be involved in the current research, her available time for any one task was limited.

Carolyn had built up considerable experience teaching a Prep class, and was enjoying using the IWB to engage these children. Carolyn described the IWB as:

> A really good asset for the little ones, as … you’ve got visual, you’ve got auditory, and you’ve got the touching – kinaesthetic learning. On the positive it has all been
terrific and see they are used to all whizz bang things happening [using technology at home] so that is what they prefer.

When searching for new digital resources for a topic Carolyn had a number of internet sites that she would visit first. One regular site she used was the website of a primary school in the UK which linked curriculum topics to appropriate digital resources. Her membership in a number of professional teams, through her role as English Co-ordinator in the school, and through her professional learning team (PLT) helped her to continually update her knowledge of suitable teaching resources. She had a number of contacts in other schools who would email her lists of good websites, and she was proactive at facilitating the sharing of digital resources during her PLT meetings within the school. She also found searching the internet to be a good way of finding new IWB resources which she tended to do from home. She stated that:

Someone has found something called interactive which I hadn’t looked at yet, but one of the girls said this is a good site – it is called interactive or something, so on the weekend I will probably Google it and find out what it is all about… I don’t really know what it is yet but I will go and investigate. That is all you need.

In her role as English and Level 1 Co-ordinator Carolyn was able to purchase new software programs when access to appropriate resources in specific areas was limited. She had become involved in purchasing a reading, writing and comprehension program for Level One students. Carolyn found this to be a good way of accessing quality resources, appropriate to her students and the curriculum. However, it did require a time commitment to determine the quality of advertised material, as this was often done by attending workshops or demonstrations.

Carolyn had found the professional development for the Easiteach IWB software, which was conducted before IWBs were placed in classrooms to be ineffective. Despite this Carolyn had developed a number of resources using Easiteach which she had found to be very popular with the children in her class as they could be easily manipulated. She had found the local professional development involving individual teachers taking the stage to share their IWB teaching practices to be beneficial. She said:
Well I do have to say that when I was PD’d on Easiteach - before I got a whiteboard. So you are listening to this and it went right over our heads. Then I get it and ok I can’t remember this, that or the other. The best PD I have been to is when we had a cluster and it was at [another school], and everyone presented something there and I found that the most useful and practical. That was all you really wanted.

Carolyn’s system of storing resources relied upon time efficiency as its main priority. When other teachers talked of good quality sites her response was ‘email me, and if it is good, then straight to my interactive whiteboard favourites’. However, she did not include resources she was not using all the time.

As a way of documenting this process Carolyn included a list of suitable websites in her term planning files which she posted on the staff intranet for all to access. Although this system was working quite effectively for Carolyn she thought that if a resource was only used for a couple of weeks, it would not be included in either her favourites or the planning documents. She felt that a teacher new to her year level would have to rely upon word of mouth to access pertinent websites.

Two teachers involved in interviews were teaching VELS Level 1 classes. Both Carolyn and Amanda reported being happy with the sharing occurring within their team. All four teachers on Carolyn’s year level worked in very close proximity to each other, with a door onto a common hallway. Carolyn said that on ‘our year level it is still word of mouth or come and look at this’.

They found that not only were other members of the team popping into their rooms to share good websites, but during professional learning team meetings members were bringing their laptops and having what Carolyn described as a ‘quick show’ of IWB resources. She felt that sites were more likely to be used when teachers had seen them demonstrated. These teachers regularly emailed each other new resources, and consequently Carolyn not only had a large number of resources she was using, but she felt she was accessing new IWB resources as well. She said, ‘You hear that all around – “Oh I found this great site” and everyone is keen to hear about it because it is instantaneous’.
While discussing how to help teachers access digital resources Carolyn was concerned that any system developed would need to remain relevant over time, and that the first hurdle would be getting teachers to use a collection of resources. She was concerned that it would ‘be great to start off with but then people will forget about it’.

Carolyn thought one good idea would be for teachers to share some of the websites they were using in their classrooms at the beginning of staff meetings. If these resources were then put in a database, teachers wanting to access the demonstrated resources would need to visit the database to follow the link to that resource. Carolyn favoured the use of a wiki to store the digital resources, and thought computer committee members could be in charge of updating the list of resources. Carolyn felt these ideas could help to make a database of resources relevant over time.

**Amanda**

Amanda is a young teacher in the school who had gained experience using an IWB while working in a school in the UK. Amanda felt that the IWB had enhanced her teaching although she was finding that there were ‘not as many good websites to use for the IWB’ in Australia. Although new to the school and still seeming to be gaining confidence, her previous IWB experience meant she appeared to have a quiet assurance about her ability to use the IWB.

When looking for new IWB digital resources Amanda would search 6 of the favourite sites she had discovered while working in the UK. Some of these were websites designed by UK schools which linked digital resources to curriculum areas. She said:

> I usually use maybe six sites...UK sites that I have used for years, that I keep using and I suppose I should try and see if there is something in Australia that I could use. I would love to find a search engine Australian based.

On these websites Amanda could follow the links to locate new resources for her current students. The only draw back to this approach, she felt, was not getting enough Australian content in her IWB resources. Amanda thought this could be
overcome by attending Australian professional development. Amanda said that in the UK:

We had, for our region they had a special site we could go to that had really good links. Or they would have a school that was the leader school in the UK and you knew you could go onto their website and they had links to everything for the IWB. So I think Australia is a little bit behind in the development of programs and links.

While using a science textbook, which named links to IWB resources, Amanda had accessed a resource based on the Learning Federation website. This set of resources was accessed through a link on the DEECD website. Amanda said:

We were doing a science unit out of a book – Primary science or Hands on Science - and it had a link, it had the learning federation link and that was really good.

Although this website contained a large number of resources linked to curriculum ideas Amanda had not revisited this site.

Amanda felt her biggest barrier to using ICT resources was having access to a range of quality resources, and particularly those that included Australian content. She said:

I would love to have some Australian PD for finding an avenue [to Australian based internet resources] because sometimes they have got these English accents.

She felt that being able to access quality digital resources was dependent upon on-going professional development, and having the time to search for resources. Amanda had joined the school after the Easiteach training had been conducted, and having used a different brand of IWB in the UK stated that her Easiteach knowledge had come from ‘just playing around with it’. Amanda had found that some of the easy to prepare resources using Easiteach templates were highly effective with her class, and talked about creating PowerPoint slides for staff room presentations.

Amanda also mentioned that as a whole staff there was very little sharing of IWB resources, for example, during staff meetings. Her school in the UK had run training sessions, on alternate weeks to staff meetings, which had sometimes focused on resources for the IWB.
In her classroom Amanda felt the IWB was placed too high for her prep children to reach. Even Amanda could not reach the top of the board, making minimising software by touching the IWB impossible. Amanda also found that the placement of lead connections for the IWB in her classroom meant she could not attach her laptop to the IWB from her desk. Amanda needed to place her laptop on a small table on the opposite side of the room to her desk, which made using the IWB difficult. She felt this problem could be fixed by having a second connection point for the IWB, on the other side of the classroom.

When talking about how to help teachers store and share digital resources within the school Amanda thought that it would be important with any system of storing resources that finding resources was made straightforward, for example by using categories of appropriate headings. Amanda saw linking IWB resources to the local curriculum as the main advantage of having a school database of resources.

**Sharon**

Sharon is a teacher in her late twenties who is excited about the use of new technologies. She has worked hard to incorporate ICT into her classroom in the past but with a change of year level she is finding this more difficult. She describes herself as someone who has grown up with technology, and demonstrates a good working knowledge of a variety of ICTs.

When the current study began Sharon was teaching a Grade 6 class for the first time, having spent three years teaching Grade 3. Sharon had enjoyed using the IWB to provide stimulus for a new topic or to demonstrate a new activity while teaching Grade 3, but commented that there was less need for a whole class demonstration of activities in the upper school. She felt the IWB was not used as extensively in Grade 6 because there were not as many resources at this level, and due to the time pressures of a very extensive Grade 6 curriculum. She also thought this was a year where more personal handwritten tasks were required of the children.
When accessing resources for the IWB Sharon talked about using a search engine to search the internet, and stated that ‘Google is my friend’. She felt that searching on the internet was time consuming and that it was hard to find the ‘time to fit [the resources] into the school day’. She said that it took ‘a lot of time to find interactive resources that are appropriate’ and one challenge was ‘using the correct keyword’. After experimentation Sharon had discovered that when looking for a resource to use on the IWB the keyword ‘interactive’ along with a topic heading like ‘simple machines’ had produced good results, but that this needed to be learnt through trial and error.

Although she liked some of the software programs that were housed in the library or loaded onto computers, Sharon was not currently using any in her classroom. Sharon had spent time creating a number of resources in Easiteach, using the available templates. She had used a Learning Federation resource which she found was linked through the DEECD website after a colleague mentioned the resource during a meeting. She thought this Learning Federation resource was quite good for her chosen topic; however, like Amanda, she had not revisited the website.

Sharon had the internet drop out in her classroom a few times a day, and although it caused her frustration she seemed to accept this problem. She said:

Yes I find it frustrating that I go on and off wireless especially just when I am sitting here [at her desk]. I can handle it because I am used to it now. It just gets irritating every once in a while having to reconnect. It happens once or twice a day. I just have to move around my desk and try to find it again. Or restart the computer and hope it finds it.

She had let the technician know of this fault and he had promised to install a new router for the wifi system, however after a number of months this had not occurred. During one of the interviews, Sharon said that she had been without the internet for the previous three days. She said:

And because he [the technician] is only here once a week if something goes wrong you try …I tried to problem solve but…It is ok now I realise what was wrong. He showed me what was wrong so I could probably fix it next time but I thought that was already fixed. I had written the proxy in two weeks ago and he said ‘is the proxy
there?’ and I said ‘yeah of course’, and he went in to it and it was blank. So it has
deleted itself somehow.

Another common problem for Sharon was that the school’s filtering software blocked
access to a number of sites she wanted to use in the classroom. As YouTube was
blocked by this filter Sharon had downloaded a program at home to enable her to
copy YouTube videos, which she put on a disk and ran on her laptop at school.
Sharon described this process as complicated. Sharon was quite confident in her own
computer ability however, and felt that the only reason she would need further
professional development in relation to the IWB was if any new software was
released.

She stored the digital resources she was using in her favourites tab in Internet
Explorer, in her weekly or term planner, or on group activity instruction cards. She
used her Internet Explorer favourites list to include all the websites she was using in
the classroom, which she organised using a number of folders. Her professional
learning team did not include IWB resources in their planning documents, but would
research digital resources after planning the unit, emailing each other with possible
resources. She said:

We will think about what topics we will do. We will go away and try and find things
and then when we find things we will email each other. So I probably just have a
whole lot of things in my edumail [staff email account].

Sharon describes going back through her weekly planner to find resources that she
used two years ago. She said:

In my own personal documents - when I go back week by week, I will have ‘used this
website’, or ‘used this file that I have created’.
I’ll remember which term it is because a lot of the, say maths, will be very similar
term by term, so I will just have a look through my folders to see what I can find.
It is quite tedious ... that is working for me but it wouldn’t work for someone else.

Sharon said that a new staff member at this year level would rely on word of mouth to
discover digital resources being used.
Sharon was not in close proximity to other teachers on her year level, but she felt this did not impact on her ability to share resources, as the easiest way for sharing digital resources was through a digital system, like email. Thus she felt proximity only had a minimal impact on the effectiveness of sharing IWB resources.

To assist teachers accessing digital resources Sharon recommended that the key to any system would be having someone to co-ordinate the process. She felt that the loss of a computer teacher three years previously had meant the school was missing someone to organise ICT resources.

She was keen to have a list of IWB resources housed on the internet as she noted that as the school intranet was not accessible from home, files placed on it were less useful. Sharon was concerned about privacy as she had once had a student ring her on the weekend after accessing her personal information placed on a wiki. Thus for Sharon it was important that if the system of storing resources was placed on the internet it did not include private information.

**Hilary**

Hilary is a teacher nearing the end of her teaching career who still enjoys experimenting with technology. It appeared she was switched on to new possibilities, and was able to work through potential barriers when using ICT. During the current study Hilary developed a planning document for her year level which recorded IWB resources. Hilary said:

> I have designed a new sheet this year to go with our language… [it includes] a shared reading title and the activity and IWB resource. Then if people have got websites they have been to, they can write them there.

Hilary was the only teacher interviewed who did not have the internet connected at home. She found it hard to find the time to look for internet based teaching resources while at school. She did, however, name teachers in her professional learning team, who shared resources with her informally at Professional Learning Team meetings, as an important source of IWB resources. She said:
I must say that working with James and Sharon and Cathy they’re really good, and
Andrew, they are always finding links for us.
It is really helpful because I am not on the internet at home so really at school is the
only time I get to be doing things so if they get it [IWB resources] for me that is half
my battle done.

She felt happier accessing resources through sites that she had come to know, and
liked the idea of text books that came with digital resources. She described the
interactive resources which came with the Nelson maths text book (Feely & Rogers,
2008) as ‘good, basic, solid, and not all about equations, or giving the right answer’.

Hilary noted the importance of having Australian internet resources when teaching
language to young children, and commented:

Bearing in mind if you use too many English sites and too many American sites the
language is slightly different.

When talking of the barriers to using ICT she referred to both the time to find
resources and the time to create resources. She noted that in a Grade 1 classroom it
took longer to create a digital resource than to implement the activity. She did qualify
this by noting that a digital resource could be saved and used again. She had
developed a number of resources to be used in Easiteach, and had also had success on
the IWB with a PowerPoint slide she had developed as an alternative to flash cards.
She did feel that ‘finding resources was easier than making them’, however she had
not spent a lot of time searching for resources.

Hilary had experienced a technical barrier when she discovered that files placed on
the intranet could not be accessed in the classroom by the children. She had done
some investigation to ensure that these files were placed on the server where they
were available to the children. Hilary had also experienced problems when folders for
sharing Easiteach resources and planning documents, which were placed where only
staff could access them, were accidently moved or deleted by other staff members
trying to use them.
When asked about the role of professional development in her IWB resource usage, Hilary, like Carolyn, noted how the original training in Easiteach had been conducted before the IWBs were placed in classrooms. She noted that her Easiteach knowledge had come from ‘basically experimenting with it myself’, but felt that now she had experience using the IWB she would like to revisit some Easiteach training.

The Grade 1 year level had a new teacher this year and Hilary thought she was relying on word of mouth to discover IWB resources, and stated:

> I would be hopeful that there would be someone here who would say ‘Oh yeah we used that website and it was such and such’ – chance games whatever it is. Where do you store this stuff? That’s the problem!

Hilary noted that although she had created a new planning document for shared reading which recorded IWB resources, the inclusion of IWB resources had not yet entered year level planning documents. In storing her IWB resources Hilary used a number of folders in an Internet Explorer favourites list, and an Easiteach folder on the intranet. However, as none of these resources were in her year level planning documents, she was relying on her memory to remember which topics had incorporated IWB resources.

When discussing what could be done in the school to assist teachers finding IWB resources Hilary was of the opinion that storing files on the intranet was problematic. She felt it was important to consider how resources could be updated and said:

> Well it is all very well if you can save into them as long as you can’t delete them.
> And does everyone have the same saving rights and access rights?

She was concerned that any compilation of IWB resources be as simple as possible to access as she felt that ‘if it is time consuming and difficult people just have a mental block’.

**Summary**

This section has presented the stories gained while interviewing the teachers, as well as the data from the survey. In the next chapter these results will be analysed in the light of the main areas under investigation in this study.
Chapter 5

Discussion

This section will investigate the results in terms of the research questions. First, a section drawing together all the data relating to the teachers’ access to digital resources will be examined and second the importance of a number of factors which can impact upon the teacher’s ability to access digital resources is presented. These factors include: the time to locate quality resources; technical issues; the teacher’s ICT confidence and the effects of professional development. Finally this chapter considers how to assist these teachers to access digital resources by compiling the data relating to how the teachers store and share digital resources for the IWB, and their recommendations for future sharing.

Access to digital resources

Analysis of all the data relating to how these teachers access digital resources for the IWB suggests they were using a number of different methods. Teachers in the survey group relied upon searching the internet, other teachers and professional development days, while the interview group showed a preference for searching the internet and creating their own resources, although they also noted a level of sharing between teachers. The one similarity that does come to light here is that both groups of teachers relied on the internet to source their digital resources.

In the discussion of the data, and what they mean, it is important to understand the makeup of the two groups of participants. By examining that, it is possible to explain why the survey group and the interview group reported differences in the ways they accessed digital resources.

The survey group was made up of all 20 teachers in the school, while the teachers who were interviewed consisted only of those who volunteered to be interviewed about their ICT usage. During the interview process I found that when teachers discussed examples of good ICT use, those examples involved either the teacher’s own practice, or were examples from another teacher in the interview sample. I soon
realised that the teachers who had volunteered for interviews seemed to be the most highly skilled ICT users in the school, while the sample of teachers who had completed surveys represented a wider range of ICT skills.

These differences in the two groups of teachers could explain the disparity between how these groups of teachers access digital resources, as shown by the survey and interview data. The teachers in the survey group not only relied upon the internet for IWB resources, but also depended upon other teachers and professional development days. Thus these teachers with a wider range of ICT skills were more likely to rely upon others to access their digital resources. It appeared that they found it important to have access to other people who could help them to find digital resources.

The more highly skilled ICT users however, who showed a preference for searching the internet and creating their own resources, were mainly relying upon their own abilities to access digital resources. They appeared to prefer their own skills to access resources, rather than relying on others.

An examination of the interview data, which presented an in-depth investigation of each teacher’s behaviour, was able to produce a clearer picture of how the teachers access digital resources for their IWBs. Interestingly the interview results suggest that the methods used to find IWB resources were idiosyncratic to the teacher. Cathy and Sharon tended to rely upon their own ability to search the internet using specific criteria, and talked of the issues that accompany using a search engine. Carolyn, as well as searching the internet, had a number of preferred sites that she would visit first, and was kept up to date with available resources through colleagues emailing her links to new resources. Amanda had a few favourite sites that she had found in her previous experience with IWBs, and Hilary, being the only teacher not to have the internet at home, enjoyed creating her own Easiteach resources but tended to rely on the other teachers in her year level for internet based IWB resources.

This behaviour is similar to that presented by Somekh et al (2007) who looked at the implementation of IWBs in the UK and found that teachers enjoyed finding their own resources using Google and tended to have a bank of their favourite resources or websites. In the UK however, when schools implemented IWBs they assigned a staff
member to be responsible for helping teachers to find digital resources for the IWBs, and this was most often the ICT co-ordinator or subject co-ordinator (Somekh et al., 2007). When schools have not allocated a staff member to ensure that teachers are able to access digital resources, then this responsibility simply becomes part of the teacher’s job, as it appears to be for the teachers in the current study.

One method of accessing quality assured digital resources linked to the curriculum discussed by these teachers did not require them to spend time finding the resources. The Nelson text books (Feely & Rogers, 2008) with accompanying digital resources were talked about favourably, particularly by Hilary. One teacher in the study, Carolyn, also found purchasing new software to be an efficient way to access digital resources, although she noted that choosing quality software could be time consuming.

Even though the internet was a regular source of IWB resources, none of the teachers talked about using links provided by the DEECD to access resources. Two teachers in the interview group had used Learning Federation resources ("The Learning Federation," 2010) when links were provided with text books or recommended by colleagues, but had not considered the link through the DEECD website to be an ongoing source of IWB resources. This behaviour was also observed in the Somekh et al (2007) report which noted that although the National Whiteboard Network website was highly regarded by a large number of teachers in their study it was not being utilised as much as they had expected.

This tendency not to rely upon government provided sources of digital resources is different to the NSW example reported by Hunter and Beveridge (2006). They found that the targeted portal established by the government to link digital resources to the syllabus was being used extensively by teachers, and had received 16 million hits before July 2006.

In Canada the establishment of a digital repository of quality assessed digital resources, involved creating a rubric for evaluating digital resources which could be used by any member of their association (Leacock & Nesbit, 2007). A collection of these quality assessed resources was then made available through their portal. This
method, which includes groups of teachers in the assessment of resources, could help to ensure a portal of resources is utilised by teachers.

During the interviews the teachers also discussed creating their own resources. Easiteach, Word and PowerPoint were all mentioned as software used to create resources. The survey showed that most teachers in the school were using features of Easiteach (80%), while the teachers in the interviews discussed using the templates available in Easiteach to develop digital resources. Many of the Easiteach resources developed by these teachers would fit into the easily modifiable category which Somekh et al (2007) found was a key feature of the resources the teachers in their study favoured.

It appears that the internet is the main source of IWB resources for the teachers in the study school. A key implication of this is that if schools are interested in supporting teachers when they place an IWB in their classroom then ensuring they have access to quality internet based resources may be important.

Beyond using the internet the teachers in the survey group and the interview group rely upon a range of sources of IWB resources. The differences in these two groups suggest that a variety of initiatives may be necessary to assist these teachers to access digital resources. More capable ICT users could be supported by giving them easy access to a range of quality assured digital resources to allow them to choose the resources which best meet their needs, as well as ensuring they have the time and expertise to create their own resources. For the wider group of teachers it may also be important to provide opportunities to meet with other ICT users as well as access to professional development.

Two of the preferred sources of IWB resources named here are the text book resources, which provide classroom appropriate resources linked to the curriculum, and the easily modifiable Easiteach templates. As both of these sources of IWB resources are easy to access, teachers may be assisted by being provided with more resources of this type.
Unlike the UK example the teachers in the current study had sole responsibility for finding their own digital resources for the IWB. With no one monitoring if these teachers are able to access IWB resources it seems possible that some teachers may be prevented from using the IWB when they do not have access to appropriate resources.

Another question to be asked here is why the DEECD portal is not seen as a potential source of digital resources by these teachers. The implication is that the provision of such websites by a government body may require more than its mere existence to entice teachers into using such links. Some insights into providing a well utilised portal could be gained from researching the NSW and Canadian examples.

**Other factors affecting access to digital resources**

For these teachers there is a diverse range of barriers that impact on their ability to find and use IWB resources. Whether these were small problems which could be addressed by the teacher, or larger issues which needed the attention of the technician, all the teachers had a number of issues which were impacting on their ability to access digital resources for the IWB.

Again there is a difference in the outcomes of the survey and the interviews. The survey group listed the availability of technical support as the number one barrier to using ICT, followed by the time to locate resources and the availability of suitable training. However the smaller group of teachers involved in the interviews focused upon finding quality resources and then the provision of technical support as the most significant barriers.

These differences may be due to differences in the groups of teachers. The group of seemingly more highly skilled ICT users involved in interviews were more reliant upon searching the internet to find their IWB resources, and thus named the ability to find quality resources as their greatest concern. Teachers in this group were also more likely to be able to overcome some of their technical issues. Teachers in the survey group, however, also relied upon other teachers and professional development
days to find their resources. With less ability to resolve their own technical problems, these issues became the greatest barriers to using ICT.

The one common theme that emerged here is that for both groups the two most significant barriers were finding quality digital resources and the availability of technical support.

An analysis of the interviews gives insight into the types of barriers that these teachers were facing in their access to digital resources for the IWB. One barrier which the teachers mentioned often was the time to locate resources, and more specifically the time to find quality IWB resources which met the specific educational requirements of their classes. The teachers found that having the time to search for resources was made more difficult by the need to gain experience searching the internet, and the need to include Australian content. The issue of time was named as a critical factor in whether teachers were finding and using IWB resources.

This experience was also noted by Murcia and McKenzie (2009) who reported that teachers were becoming frustrated by the amount of time needed to search the internet to find quality IWB resources, and that this was related to the variable quality of these resources. Handal et al. (2006) also noted the inconsistent quality of online educational resources and the problems that raised for teachers.

The time to find ICT resources was named by BECTA (2004) as a factor which could deter teachers from using technology. Without appropriate resources it was felt teachers were limited in what they could do with ICT in the classroom, and the distinction was made between having sufficient access to ICT resources and having access to quality ICT resources.

For the teachers in the current study there were also a large number of technical issues which appeared to affect their ability to access and use digital resources with the IWB. These ranged from problems with the wireless and internet connection, the filtering software, access to the technician, and sharing files on the intranet, as well as the placement of the IWBs, the connecting cords and the computer itself.
The number of technical problems could be the result of a lack of access to the technician, or an inability of the technician to solve the problems. The technician was only available in the school one day a week and some problems were not being addressed over time, with issues relating to the wireless internet service not resolved after many months.

During the interview process there was one occasion where the teachers reported that the school had been without internet access for two days, and Sharon found that the connection to the internet dropped out in her room a few times a day. Somekh et al. (2007) feel that the failure of the internet when using online resources was a serious disruption rather than a discouraging nuisance and Cartwright and Hammond (2007) see good technical support as being pivotal in helping to sustain ICT use.

Cathy commented on the reliance upon a number of different pieces of technology when using the IWB and this could also contribute to the number of technical issues. This supported comments by Murcia and McKenzie (2009) who noted that as the IWB relies upon the connection of a range of different technologies, a problem with any one component can make using the IWB impossible. They feel these issues detract from the effective use of the IWB.

The list of potential technical problems also included some more practical issues. Amanda, Carolyn and Cathy all mentioned the inability of the young children in their classrooms to reach the IWB. Amanda found the use of the IWB was restricted by the placement of leads and power cords in her room, while Cathy felt the use of a dedicated computer for the IWB was preferable to using their personal laptops. Hilary had experienced many issues when trying to place files on the intranet that could be accessed by children and shared with teachers.

The current study included an investigation of the teachers’ levels of ICT confidence and if this had a relationship to gender or the number of years of teaching experience. The results from the survey showed that the teachers in this school exhibited a relatively high level of ICT confidence with 80% of teachers rating themselves as 3 or above on a 5 point scale. This level of confidence in their ICT ability could suggest that the day to day exposure to technology associated with IWB use is having a
positive effect on their ICT confidence, especially as the average level of ICT confidence was the same for all teachers regardless of their gender or number of years of teaching experience.

BECTA, in their 2004 report on the barriers to ICT use, named ICT confidence as a significant determinant of whether teachers were using technology. They felt that to address the issue of ICT confidence schools needed to ensure maximum use for all users. In this school where teachers have permanent day to day access to an IWB it is encouraging to see that this level of accessibility is connected to relatively high levels of ICT confidence. Lewin et al. (2009) also note that a teacher’s general ICT skills improved with daily use of the IWB.

Similar to the current study the BECTA (2004) study found that age did not impact on the teachers’ ICT use, and Erikson et al (2006) found that the level of enthusiasm when implementing an IWB was the same for teachers of different ages.

It is problems with teachers’ access to digital resources that relate to time, effort, skills and Australian content, which pose the biggest questions. Are schools expecting too much when they place an IWB in a classroom and leave it to individual teachers to access their own digital resources? What could schools do to ensure that teachers are not being prevented from using the IWB by limited access to appropriate digital resources?

To ensure that all teachers who are motivated to incorporate digital resources into their teaching are able to do so, it is also important that technical barriers are being addressed. One point made by BECTA (2004) was that technical faults and a lack of technical support can mean teachers will avoid using the technology for fear of recurring faults.

Exactly how and why this number of technical factors are impacting on these teachers is not clear. Sufficient access to a qualified technician could be one explanation, as could be the reliance of the IWB on a number of pieces of technology. One thing becomes obvious though, that supporting teachers in the implementation of the IWB may mean increasing or at least monitoring the teacher’s access to qualified support.
Professional development

Although all the teachers in the interviews were asked about their needs for further training relating to the IWB, none of them were keen to spend time talking about professional development (PD). The survey results show that teachers in the school were gaining IWB knowledge from PD days, with 75% saying they were of benefit to their teaching practice. However, these teachers report that attending PD sessions did not provide them with an important source of IWB resources, as only 10% name it as the most helpful source.

During the interviews I found that none of the teachers had been particularly inspired by any of the PD they had attended. The exceptions to this were Carolyn’s enjoyment of the teacher to teacher sharing that was conducted in a local school and Hilary’s interest in extending her knowledge of Easiteach. Amanda, who had never attended ICT professional development in Australia, was keen to attend professional development to enable her to include Australian content in her use of digital resources. However, both Cathy and Sharon felt they required no further professional development on the use of the IWB, despite the fact that Cathy wanted to expand her knowledge of quality resources for the IWB.

This general reluctance to discuss professional development in any length, with two teachers claiming that they need no more IWB related professional development seems out of context with teachers who are switched onto the possibilities of ICT use and appear enthusiastic about increasing their ICT knowledge.

Two factors which could explain this anomaly are the lack of ICT related professional development which seems available, and the inability of previous PD to meet the needs of the teachers. From the interview with Dianne it appeared that although the DEECD chose and purchased the first IWBs for this school they had provided no ongoing guidance on implementation or professional development. In fact, she stated that professional development sessions were being organised at a school level to meet a growing common need amongst local schools.
The general dissatisfaction with the Easiteach training sessions, which were conducted by the IWB supplier before the teachers had access to an IWB (and in Carolyn’s opinion had gone right over their heads), may have created some negative connotations to IWB professional development in general. This concurs with Murcia and McKenzie (2009) and Haldane (2008) who noted how important it was to have professional development that meets individual teacher needs.

Many researchers have noted the potential of the IWB to support a more interactive teaching style (Glover et al., 2005; Higgins et al., 2007; Kennewell & Beauchamp, 2007; Vincent & Jones, 2008). Just how to advance a teacher’s IWB professional learning is not clear from the research but Vincent and Jones (2008) see the importance of peer mentors in bringing about pedagogical change when using the IWB, and Lewin et al (2009) and Erikson et al (2006) feel that having training that focuses on pedagogy is important. If professional development that focuses upon pedagogical change could be important to facilitate the potential of the IWB, and this is not available to the teachers in the current study, then it is worth questioning whether they have access to the type of information necessary to fully utilise the potential of the IWB.

The worrying finding here is that I felt these teachers in general did not seem to be excited about using professional development to expand their knowledge of IWB resources. The reasons for this are not clear from the research, but may be related to previous professional development sessions, or the lack of available IWB related professional development to inspire these teachers.

**Storing and Sharing digital resources**

In order to consider how to assist teachers to access digital resources for the IWB, the current study first looked at how teachers stored and shared their digital resources. Although a number of teachers had developed ways of storing their IWB resources, no one was using a method by which it was possible to easily and effectively recall resources. By asking teachers during interviews to consider how a teacher new to
their year level would find IWB resources, it was possible to evaluate how easily they could be accessed again.

Resources were being stored in the favourites tab of Internet Explorer, on the intranet, in planning documents, on group activity instruction cards or in emails. Sharon included all the resources that she used in her favourites tab in Internet Explorer, and kept emails containing links to resources, as well as recording resources in her weekly planner. However, she found going through her weekly planner to relocate resources used in past years to be tedious. Similarly Carolyn stored resources in Internet Explorer, and in term planning documents, but stated that resources only used a few times would not be recorded anywhere. Hilary found her new language planning document, which included IWB resources, to be useful, but noted that digital resources were still not being included in the year level planning documents.

These findings are in line with the research by Somekh et al (2007) which found that teachers were storing their IWB resources on the school server, and in personal or shared areas.

Hilary’s comment; ‘Where do you store stuff? This is the problem’ sums up the situation very well. The implications for this research are that currently there is no one method for storing digital resources being used within the school which allows for the effective recall of digital resources. Although individual teachers have devised systems that suit their own needs, none of these methods could be used on a whole school level to effectively recall IWB resources.

Data from the survey and the interviews suggested that teachers were relying upon each other to access digital resources. In the survey teachers in the school were named as the second most important source of IWB resources, and teachers in other schools as the third most helpful source. The school principal, Dianne, also noted that teachers within the school were sharing their IWB resources.

All of the sharing between teachers in this school was done either by word of mouth or through emails. Word of mouth included ad-hoc exchanges while moving around within the school, or what occurred in professional learning team meetings. The way
these exchanges took place was different for different groups of teachers within this school but tended to revolve around year levels. While Hilary reported that teachers in her year level were great at verbally sharing IWB resources during PLT meetings, Sharon felt happy with the process of emailing resources after planning a unit. Hilary did note that having other teachers in her Professional Learning Team who were actively sharing IWB resources had a positive impact on her use of IWB resources.

Both Carolyn and Amanda were in a year level that reported being happy with the sharing occurring within their team. As all four teachers on this year level were in close proximity to each other, and often popped into each others’ classrooms to share resources it was possible that proximity was having a positive impact on their sharing. However, Sharon who was not located within close proximity to the rest of her team felt that physical distance had little effect on the level of sharing of digital resources, as the most effective way to share them was via a digital system like email.

One advantage of using emails, which Carolyn noted, was that it allowed her to simply click on the link to a resource, rather than needing to perform a search on the internet. However, Sharon noted that if your IWB resources were stored in your email account it could be difficult to find them at a later date.

In this study it appears that a level of sharing has sprung up around the common need to find and use digital resources for the IWB. This trend has also been noted in research which highlights how the introduction of IWBs into primary schools helps to create good sharing opportunities, with an increased level of collaboration between colleagues as all teachers are learning the role simultaneously (Kennewell & Beauchamp, 2007; Murcia & McKenzie, 2009; Somekh et al., 2007).

As there was no formal method of sharing within the school a number of issues had emerged. When the teachers attempted to share their IWB resources on the staff intranet a file was accidently misplaced due to a system that was not considered user friendly. This shows how important it is for any database of resources to be easy to use, with consideration given to the number of possible editors. This is supported by the research conducted by Pennell (2007) which found that part of the success of his
project to establish a digital repository for sharing digital resources was that the system provided simple access and easy user interactions.

Another concern identified in the interviews was the need for sharing to be reciprocated. When sharing is operating on an ad hoc level then it is possible for some teachers to feel that the sharing is all one way. This situation can be addressed when there is a formal system of sharing in place and all teachers are responsible for finding and sharing resources.

Amanda, who had been in the UK and experienced regular staff training sessions, also mentioned that as a whole staff there was very little sharing of IWB resources.

The introduction of the IWB and the common need for IWB resources that this entails does seem to have created an atmosphere that is conducive to sharing. Teachers are actively sharing their IWB resources in meetings, through emails, or while moving around the school, mostly with colleagues within the same year level on an ad hoc basis. It seems that having teachers who actively share resources can have a positive impact upon the access to resources for other teachers on that year level.

The introduction of a formal system of sharing could address the issues that arise when teachers attempt their own methods of sharing on the intranet, when sharing is not reciprocated or not conducted across the whole school.

**Recommendations for a new system of sharing**

Teachers in the interview group were all interested in talking about how to assist the sharing of resources within the school and had a number of different concerns that need to be taken into consideration. Discussions centred on sharing resources across the school by building a database to store IWB resources, or links to internet based resources, currently being used by teachers in the school.

Placing a folder of IWB resources on the school intranet highlighted the need to consider the number of potential editors and ensuring it was user friendly. Sharon and
Cathy both thought it was important that the database was accessible from home, meaning that any solution would need to be housed on the internet. Some teachers in the survey recommended using a website for storing resources used within the school. However, Cathy felt that maintaining the website would be time consuming and outside a teacher’s job description.

During the course of the interviews the possibility of using a wiki to store and share the digital resource used on the IWB was discussed. This addressed the need to ensure the solution was easy to update, allowed editing by a small number of teachers and was accessible from home. Sharon had also been concerned that information placed on the wiki could be viewed by anyone, however, as it was anticipated that information placed on the school wiki would not be of a sensitive nature this was not considered a problem.

Both Cathy and Amanda felt that resources needed to be well categorised with the use of appropriate headings so that finding resources was straightforward, while the survey results suggested linking the resources to the local curriculum. Amanda saw this link as being the main advantage of having a school database of resources. This meant that the Victorian Essential Learning Standards (VELS) headings could be used to clearly set out the resources.

One of the issues with building a school based initiative to provide access to IWB resources was the collection of all the digital resources being used within the school. This was potentially an arduous process, but with the plan developed by Carolyn a system for collecting resources became possible. She liked the idea of beginning staff meetings with a teacher demonstrating a number of IWB resources they were currently using, and ICT committee members being responsible for placing the demonstrated resource in the database. If all staff members were expected to conduct a staff meeting demonstration then the issue concerning Cathy regarding the reciprocation of sharing could be addressed. This process also ensures that someone is responsible for the ongoing development of the system, which Sharon felt was important, and that it remained relevant over time.
Summary

This chapter brings some insights into the ways in which teachers’ access digital resources, and the types of problems they face. The investigation also sheds light on the ways that a school based approach could be used to assist teacher access to IWB resources. The final chapter will attempt to place these ideas in a wider context.
Chapter 6

Conclusion

The IWB is being introduced into many Australian schools and is experiencing a level of popularity that has previously not been associated with the introduction of a new technology. In the UK the rapid uptake of IWBs is unprecedented as they were welcomed enthusiastically by a large number of primary school teachers (Somekh et al., 2007). A high level of teacher enthusiasm and acceptance for the IWB has also been noted in Australian schools (Bennett & Lockyer, 2008; Erikson et al., 2006). The challenge now seems to be to maintain this positive response, with the hope of embedding the IWB into the fabric of regular primary school classrooms.

One interesting disparity between the UK and Australian implementation of IWBs is that in the UK, implementation was linked to government educational policy, included funded professional development, and the simultaneous provision of a National Whiteboard Network website to provide links to digital resources (Somekh et al., 2007). Schools in the UK also ensured that a staff member, often the ICT co-ordinator, subject co-ordinator or sometimes the technician, was responsible for helping teachers to access digital resources.

Australian schools despite using some government funding to purchase IWBs are only sometimes being linked to targeted portals, and there appears to be little evidence of government funded professional development or policy directives. Sweeney (2008) feels that as there are no formal systematic initiatives to support IWB implementation schools are calling for help to achieve the potential of the IWB. This study suggests that a teacher’s access to resources for use with the IWB is often dependent upon the teacher’s skill in finding or creating resources, and that there is limited guidance relating to professional development or implementation policies being provided to schools by relevant authorities. Schools are finding their own way through implementing IWBs.
If Australian schools hope to achieve at least some of the advancements in student performance which have been associated with IWB implementation in the UK (Lewin et al., 2009) then we may need more targeted advice for schools. The development of an Australian plan for IWB implementation, which is available for schools just beginning the installation of IWBs as well as guidelines for the ongoing support of teachers in schools that have already implemented IWBs, is overdue. Understanding the impact of IWB implementation on teacher behaviour could be vital to this process.

In this study it seemed that gaining a complete understanding of exactly how teachers access digital resources may be more complex than first expected. What does become apparent is that it is up to individual teachers to access their own digital resources for the IWB, and that unlike the UK example, there is no provision for a responsible staff member to ensure that all teachers have access to appropriate digital resources.

Given the variable quality of online resources, which both Handal et al. (2006) and Murcia and McKenzie (2009) note, some countries are assisting teachers with the arduous job of assessing online resources. In Canada and some parts of America governments have provided a rubric which is specifically designed to be used by teachers to assess the quality of online digital resources (Leacock & Nesbit, 2007). The teachers in this study were not receiving guidance or assistance regarding how to assess the quality of digital resources. It is important that schools in Australia either ensure that teachers have access to a database of resources which have been quality assessed, or provide some training in simple criteria for assessing the quality of resources. Only by understanding that teachers will be out in cyberspace attempting to locate digital resources can schools hope to assist teachers in this process.

In the project school, providing assistance to the teachers to implement the IWBs involved the provision of training in the software loaded onto the IWBs. This was the only type of professional development available to the school when the IWBs were installed and it was undertaken before the teachers had access to the IWBs. Further down the track local schools, in an attempt to address the problem of the lack of IWB specific professional development, got together to share their IWB ideas. Though this seemed valuable for some teachers, the school appeared to have no access to systematic assistance to advance teacher knowledge regarding IWB implementation.
When there is no information available to schools from the DEECD or any other authority regarding preferred ways of implementing the IWB, how can schools gain this knowledge? It is reasonable to expect the DEECD to make the research on new technologies readily available to schools, preferably in the form of implementation policies or guidelines. It would also be reasonable for the DEECD to provide or recommend trainers, who were knowledgeable in facilitating the potential of the IWB and who could assist teachers with common issues relating to IWB implementation. Schools could then make informed choices using their professional development budgets.

A number of conclusions regarding teacher behaviour can be drawn from this study. When an IWB is placed in a classroom, it seems that teachers are motivated to find their own curriculum relevant resources that meet the needs of the children in their class and this takes time and effort. The ways in which this pans out seems to be idiosyncratic to the teacher although it does appear that teachers will spend time on an internet search engine in an attempt to locate resources. More skilled ICT users will also spend time creating their own resources, while the larger group of teachers which includes those with a range of ICT skills, are likely to need help from other teachers and professional development days to access digital resources. Supporting this range of behaviours would require a school plan that was able to be adapted to different teacher needs. If schools went into the implementation of the IWB with an understanding that teachers will behave in all these ways then it could be possible to develop a plan that supports all teachers.

In the current study although many skilled teachers were able to access resources for their IWBs there were many reasons why they failed to gain the resources that they needed to implement the IWB in their classrooms. Often it was merely access to the internet that was preventing resource use during class time, but sometimes it was the time or the skills to find good quality resources, specific to the curriculum and their group of children, that stopped teachers from successfully implementing the IWB. Add to this the list of technical issues these teachers face, and even someone who can see the positive response the IWB is receiving in schools can start to worry about sustaining this level of interest.
The development of a school plan to ensure that teachers have access to a range of high quality digital resources which are linked to the curriculum and cover a range of student achievement levels, as well as providing sufficient technical assistance, could help overcome many of these concerns. These are issues that busy schools, with a range of current initiatives that demand attention, do not necessarily understand when they delve into installing IWBs in their classrooms. Co-ordinated assistance from the DEECD could help schools to access the necessary information and resources regarding effective IWB implementation.

In the current study I was pleased to note some positive impacts that IWB implementation appeared to be having on the school. The first is that the daily use of the technology that was involved in implementing the IWB may be having a positive effect on the teachers’ level of ICT confidence. As the BECTA 2004 study noted that ICT confidence was a very significant factor in whether teachers were using technology it can be hoped that this high level of ICT confidence will transfer into a high use of ICT in general as the teacher’s confidence with the use of ICT spurs them into incorporating a wider range of ICT into their lessons.

The other positive impact of IWB implementation is the creation of an atmosphere that is conducive to sharing. This phenomenon, where a community of sharing is associated with IWB implementation has been reported in a number of studies, (Kennewell & Beauchamp, 2007; Murcia & McKenzie, 2009; Somekh et al., 2007) and as Murcia and McKenzie note can stimulate a type of techno-resilience during implementation. This not only suggests that implementing IWBs will have a positive impact on the level of sharing occurring within any school, but also implies that supporting individual teachers through IWB implementation could be as simple as providing structured time to collaborate with colleagues on the topic of digital resources.

The development of a system of sharing across the school community would also allow these teachers to take back some of the control, and implement their own school based solution to the problem of limited access to appropriate IWB resources. A system of sharing such as the one generated by the teachers in this project has the potential to help all teachers access digital resources which are suitable for classroom
use and appropriate to the specific group of children in the school. No other database of resources could fit all of these criteria.

**Limitations**

One of the limitations of this study is that the teachers who volunteered for interviews regarding their IWB use seemed to be the more highly skilled ICT users. In most of the areas under study having teachers who were actively searching for and using IWB resources was an advantage, but when looking at the factors affecting their IWB resource use it may have been interesting to see what other barriers were being faced by teachers with a wider range of ICT skills. The use of a survey administered to all fulltime classroom teachers in the school did, however, mean that the results included some information on the behaviour of all teachers in the school.

**Broader Implications**

When schools are implementing IWBs the current study suggests two key issues which they should consider:

- how teachers are expected to access digital resources
- whether to increase the available technical support.

Beyond these important factors school planners need to also discuss:

- whether to make a staff member responsible for ensuring all teachers are able to access digital resources
- giving the teachers structured time to collaborate
- ensuring teachers have access to effective professional development
- monitoring the number of technical issues that build up over time
- ensuring all classrooms have consistent internet access
- how IWB implementation can create a community of sharing that can help teachers through the implementation process
- creating a system of sharing to enable teachers to share their resources across the school community
One implication for the DEECD from the current study is that portals with links to quality assured digital resources need to be made relevant to teachers, or the access they are providing to a range of high quality resources appropriate for the classroom, will not be exploited to their full potential. One method to facilitate this could be to include teachers in the assessment of the resources as was undertaken in the Canadian example (Leacock & Nesbit, 2007).

Another implication here is that school staff involved in planning the installation and implementation of IWBs may not be aware of their potential to facilitate a change in pedagogy. Without DEECD developed implementation guidelines or professional development focused upon pedagogy, the potential of the IWB may never be achieved. As it was the DEECD who placed the first IWBs in this school it would be appropriate for them to provide some policy guidelines and access to informed professional development.

Recommendations

There are a number of questions which this research exposes. In future studies it would be interesting to see whether the establishment of a school based solution to assist teachers to access digital resources for the IWB, devised in consultation with the teachers, does have a positive impact on the teacher’s use of the IWB. Similarly future research could focus on whether an increase in technical support as well as providing teachers with better access to IWB resources had a positive impact on IWB implementation.

Although a number of studies have noted that the establishment of a community of sharing is one outcome of the introduction of the IWB, there is no evidence of research which focuses solely on this phenomenon. This is the same for ICT confidence, where Lewin et al. (2009) have noted that the IWB increased a teacher’s general ICT skills, a study which specifically investigated whether the introduction of the IWB has a positive impact on ICT confidence could be beneficial.
Summary

To be involved in a project which not only investigated teacher practice but also attempted to find a school based solution to a wider problem has been very rewarding. The process of negotiation and development of a plan to address their access to IWB resources seemed to empower these teachers. It appeared that when classroom teachers are included in developing the solution to a problem the outcome is not just the system being developed, but also the feeling of empowerment this produces.
References


Appendix A

QUESTIONNAIRE RESEARCHING THE USE OF DIGITAL MATERIALS ON INTERACTIVE WHITEBOARDS (IWBS).

1. What type of ICT resources are you using on the IWB?
   a) internet-based teaching resources
   b) computer-based resources not sourced from the internet
   c) resources developed by you in Easiteach
   d) resources developed by you in another program (e.g. Word)
   e) other, please name: _____________________________

2. How do you locate ICT resources? E.g. Internet, Library, other teachers
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________

3. Has your accessing of ICT resources changed since the introduction of the IWB?
   Yes ☐ No ☐
   a) If yes, how?__________________________________________
   ___________________________________________________
   ___________________________________________________

4. a) Do you use internet-based teaching resources in your classroom?
   Yes ☐ No ☐
   b) If yes, Do you use them in your classroom everyday?
   Yes ☐ No ☐

5. Can you name three websites which you use in your classroom which you would be happy to share with other teachers in this school?
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________

6. Has the number of internet-based teaching resources you are using in your classroom changed since the introduction of Interactive Whiteboards?
   Yes, increased ☐ Yes, decreased ☐ No ☐

7. TICK the statements that apply to you. I get internet-based IWB resources from:
   a) other teachers in the school
   b) other teachers that I know in other schools
   c) professional groups in which I am involved.
   d) teacher professional development days
   d) the internet by using a search engine. If yes, which search engine (e.g. Google)__________________________

8. Which of the reasons in Question 7 has been most helpful for you?________________________________________

9. If you were web browsing for teaching resources how do you identify resources that you would use in the classroom?
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________

10. When web browsing for teaching resources do you use these characteristics to help you decide if the teaching materials are right for your classroom?
    a) looking at the URL
    b) looking to see if any curriculum ideas accompany the resource
    c) checking if the website is hosted by a name which you recognise
d) checking on the name of the website author ✗
e) checking if it is a comprehensive website with other resources on other pages ✗

11. a) Have you found teacher professional days on the use of resources on the IWB to be of benefit to your teaching practices.
   Yes ✗ Yes ✗
   No ✗ No ✗
   b) Can you explain this?

12. a) Do you belong to any groups or professional bodies which have been helpful in accessing resources for the IWB?
   Yes ✗ Yes ✗
   No ✗ No ✗
   b) If yes, explain.

13. a) Are there any particular VELS domains that you consider to be best suited to the use of internet based teaching resources on the IWB?
   Yes ✗ No ✗
   b) If yes, what are these domains?

   a) for display purposes on the Interactive whiteboard ✗
   b) for interactive use with the whole class on the IWB ✗
   c) for use by one group on the IWB during group activities ✗
   d) for individual use on the classroom computers ✗
   e) for use by groups on the classroom computers ✗

15. How can you tell that the implementation of an online teaching resource has been successful with your group of children?

16. a) Have you used any of the features of the Easiteach software that came with the Interactive Whiteboard?
   Yes ✗ Yes ✗
   No ✗ No ✗
   b) If yes, what features have you used and can you give a brief description of what you did?

17. What could be done within this school to help teachers access IWB resources. E.g. Teacher sharing, or a centralised storage of favoured resources?

18. How many years teaching experience do you have?

19. On a scale from 1-5 how would you rate your level of confidence with using ICT? ___________

20. What is your gender? Female ✗ Male ✗

21. These are common barriers to the uptake of ICT. If they apply to you, can you rate them from 1 – 5
   a) lack of confidence in using ICT ✗
   b) availability of technical support ✗
   c) lack of personal access to ICT ✗
   d) availability of suitable ICT training ✗
   e) lack of time to locate resources ✗
   f) lack of access to resources ✗
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