



# **Interactive Whiteboards in Victorian Schools: Installation and Processes of Use**

**Interim Report to the Victorian Department of Education and Training**

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## **Interactive Whiteboards in Victorian Schools: Installation and Processes of Use**

### *Introduction*

The Department of Education Interactive Whiteboard trial was established to evaluate the impact of Interactive Whiteboards (IWBs) in the classroom. By providing schools with Interactive Whiteboards the trial aimed to:

- enrich classroom resources to support learning improvements,
- provide a more stimulating and interactive classroom environment,
- support teachers to more fully integrate technology into their classroom practice,
- provide a variety of tools with which teachers can create lessons that are more inclusive of all learning styles, and
- make lessons more interactive and promoting students as active participants in the learning process,
- measure any improved educational outcomes such as engagement, participation and attendance.

The trial also aimed to establish what makes a successful Interactive Whiteboard implementation. By evaluating installation methods, Interactive Whiteboard positions, implementation ratios, targeted needs, software, supporting hardware, technical support and other required resources, the Department will frame a best practice model that can be used for future Interactive Whiteboard implementations.

The Interactive Whiteboard trial involved fifteen Primary schools, four Secondary schools and three Special Developmental schools. The twenty two trial schools were selected from across the state with fourteen schools from metropolitan regions and eight schools from three country regions representing rural, provincial and isolated schools. Schools were selected to represent a range of student performance data and clusters were formed also to represent a range of performance levels. Each cluster was expected to work on a common project designed to evaluate the Interactive Whiteboards within the context of their own schools and to meet the specific needs of their students and school community. To this end a series of meetings and materials were provided to school clusters to focus their project. Each cluster was funded between a 0.4 and 0.5 time release to facilitate a cluster leader to work closely with each school and to enable time for the schools to meet on a regular basis.

Each school was required to develop an action research proposal that involved using the Interactive Whiteboards to improve teaching and learning. It was envisaged that different schools would trial different models of usage based on their research proposal.

A continuous evaluation procedure handbook was provided. This provided the clusters with a stepwise series of questions to address, focusing on setting goals and benchmark levels of performance, identifying resources and strategies to employ. Once the boards were installed and the program mapped out, the plan focused on use and procedures used in employing the boards. The final step addressed the outcomes

and the measures of performance achieved against the targets or benchmarks. The decision on when to monitor these effects was largely up to the cluster and was dependent on their perception of the level of implementation of the boards. This being said, however, it was also necessary to maintain the perception of the school systems and the political imperative to provide advice regarding the educational utility of IWBs and their widespread implementation or adoption by the school system. Regular visits to schools were conducted to examine how the schools were implementing their evaluation model and to collate the evidence that was being accumulated by the school personnel with regard to the use of the evaluation model. The evaluation was to be essentially evidence-based in making judgements of the utility of the boards. This report focuses on these visits. The cluster evaluation programs were discussed with the schools in each visit.

While there was some diversity dependent on the nature of the cluster, the project goals common across all clusters in the trial were evaluation of:

- the impact of IWBs on student engagement in the classroom;
- the usefulness of Interactive Whiteboards for working with at risk sub-groups of students (ESL students, students with disabilities, students in high or low ability groups), or to compare gender differences in interest in working with the Interactive Whiteboards;
- impact on teacher confidence and competence in the use of ICT in the classroom; and
- pedagogical change related to Interactive Whiteboards. Most teachers are recording their expectations and maintaining diaries that monitor changes in uses.

The selected tendering company provided each school with a number of Interactive Whiteboard installations. Each installation consisted of an Interactive Whiteboard, data projector, installation, IWB software, technical support and professional development. Professional development consisted of five half day sessions. Sessions were broken into the following categories:

- Introduction and basic operation
- Getting started with interactive whiteboards
- Creating classroom resources in Literacy/SOSE
- Creating classroom resources in Maths/Science
- Advanced Skills Workshop

In addition to the above professional development, trial schools had been given access to ongoing free professional development for a period of four years from the commencement of the contract. The schools were encouraged to trial alternative installation locations, including multiple boards within a classroom and installation to the side or back of a classroom. All installation locations were chosen in consultation with the school principal but most schools chose to install their Interactive Whiteboards at the front of each room. Some were installed in the library or other common areas. In total 141 boards were installed across the 22 trial schools with all work completed within the specified 60 day installation period.

### *Evaluation*

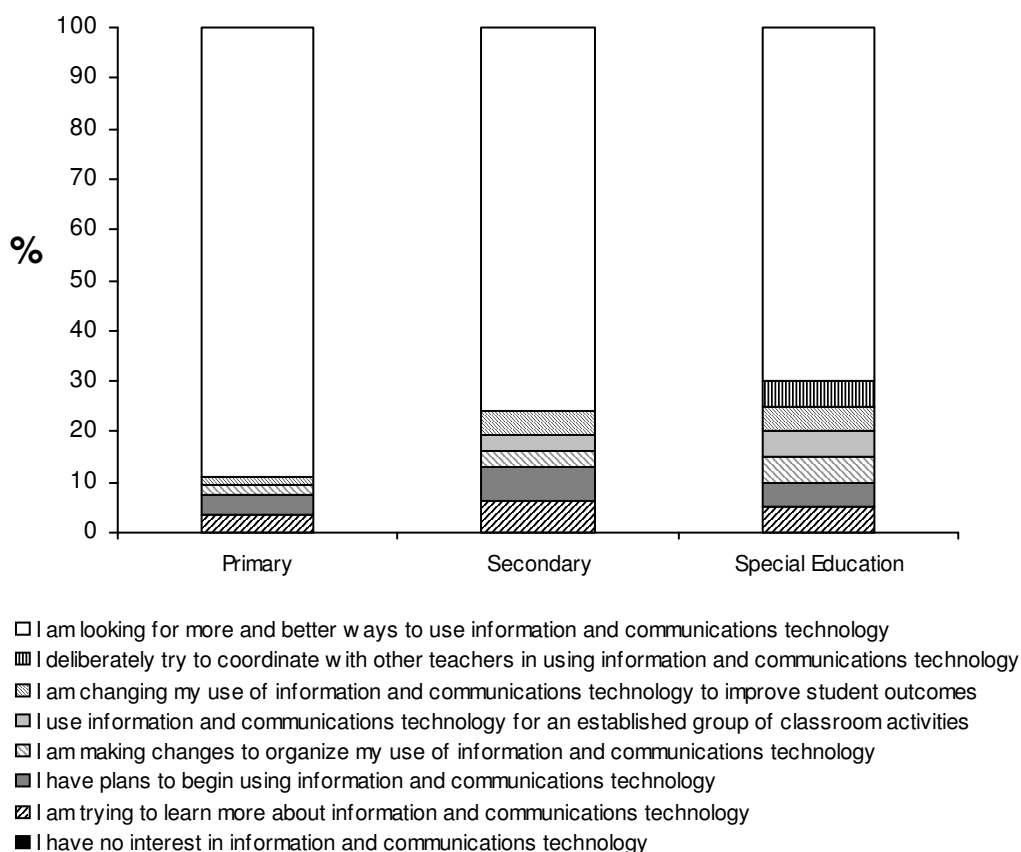
Following the installation of IWBs in twenty-two schools participating in the pilot evaluation in the last term of 2005, the evaluation team visited all these schools between March and May 2006 to investigate experiences related to installation and use of the IWBs and the establishment of the evaluation plans, goals and benchmark data as set out in the framework for action research and evaluative questions. Each school had set its own goals and parameters for the use of the IWBs. Moreover, each school was allowed the freedom to set different expectations of the use in varying curriculum areas. Each school set goals, monitored their use and collected evidence of the educational effectiveness of the IWBs. An evaluation plan was submitted to the evaluators such that the expectations and procedures were clarified prior to the evaluators' visits to the school. A series of discussions were held during school visits focusing the conversations on the framework and on the plans that the schools had submitted. The evaluators conducted focus groups and interviews with teachers to answer the following questions in relation to the evaluation framework provided to each of the schools:

- What were the goals set for the use of the whiteboards?
- What were the benchmark performance data that were to be collected? These generally included the following:
  - How often were the IWBs being used by teachers and students?
  - What were the factors that differentiated between teachers or schools who used the IWBs often and those that did not?
  - What were the conditions that supported or acted as barriers to the use of IWBs by teachers and students?
  - What were the IWBs being used to do that differed from usual teaching practices?
  - How did the use of IWBs influence teachers' ideas about teaching?
  - What were the students using the IWBs to do?
  - How did the use of IWBs in teaching impact student interest and participation?
  - How did the use of IWBs in teaching impact the learning of sub-groups of students?
  - What problems were encountered during installation of the IWBs?
  - What would schools like to change about the way the IWBs had been installed?
  - What advice would teachers like to share with other teachers and schools about using the IWBs?
  - What were the unanticipated benefits or problems associated with the use of the IWBs?
  - What did the IWBs do that increased learning? What did the students learn through the use of IWBs that they might not or would not have learned before (or how has the use of the IWB helped them learn faster)?

### *Different Schools, Different Needs*

At the commencement of the pilot, schools shared many similar goals for their use of the IWBs, including interest in the use of IWBs to improve student engagement and to boost teacher confidence and competence in the use of information and communications technology (ICT) for teaching. All schools gave access to the IWBs to teachers who showed most enthusiasm about working with the IWBs and with ICT in general. Baseline data were collected from 148 participating teachers, to record teachers' initial attitudes to working with ICT in teaching and learning.

As illustrated in Figure 1, teachers from all types of schools – Primary, Secondary and Special Education – indicated that they were actively interested in improving their use of ICT for teaching and learning. It was clear that the teachers who were chosen by schools to trial the IWBs shared a common commitment to, and interest in, the use of ICT at the start of the pilot evaluation, which was perhaps not typical of all teachers.



*Figure 1.* Baseline interest in ICT for teachers from Primary, Secondary and Special Education schools involved in the pilot evaluation of IWBs.

The baseline levels of interest as set out in Figure 1 focused on changing the use of ICT and collaboration with other teachers, but generally lacked educational or student learning focus. Due to the early timing of the visits to school, many teachers had not had sufficient time to identify appropriate learning gains or expectations and certainly insufficient time to realise evidence of learning outcomes. For this reason, most of the discussion centred on the use of the boards. This interim report presents the factors that differentiated between schools and teachers in which the IWBs had quickly become embedded in teaching practices, and those in which they had not.

***How often were the IWBs being used by teachers and students? What were the factors that differentiated between teachers or schools who used the IWBs often and those that did not?***

Despite the early timing of the visits, clear differences between schools and teachers were emerging in the ways in which they had so far used the technology in the classroom and the challenges they faced. Some teachers were using the IWBs often, and with great enthusiasm. Students in these classrooms were actively encouraged to work on the IWBs and teachers talked about the use of the IWBs for a very wide range of teaching and learning activities.

In some classrooms the IWBs were being used infrequently. Students in these locations or classrooms were not actively working on the IWBs. Instead, the boards were being used as display tools.

The frequency of use of the IWBs appeared to be related to three major factors:

- whether the teachers had initially misperceived that they needed to use special IWB software to make the IWBs work, and had become discouraged by the difficulty of learning how to use the software;
- whether the teachers had access to appropriate interactive teaching resources to use with the IWBs; and
- whether the teachers had easy and convenient access to an IWB in their classroom, or whether they had to share and timetable use of an IWB.

The first factor –misperceptions that teachers had to learn to use new IWB software in order to use the IWBs - delayed progress in terms of teacher confidence to use the IWBs in many of the schools, except those in the Special Education cluster where teachers saw the IWBs as giant touch screens and proceeded to explore them as such, and a number of the Primary schools with one or two teachers who had previous experience of working with IWBs or who were very confident with the use of ICT.

The IWB software supplied to schools is regarded as one of the leading IWB software programs on the market, and during the tender selection process it was assumed that access to such a piece of software would prove important to the success of the trial. In reality it has proven to be the opposite. When the Department of Education and Training became aware of the issues with the software the Department worked closely with schools to address these matters. This had an immediate and positive impact on the teachers' attitudes towards using the IWBs, particularly in some of the Primary schools. The Department has also contracted two professional learning officers to provide teachers with individual support through a full day visit to every trial school. These officers worked directly with teachers in response to their identified areas of need and have also provided each teacher with a CD containing IWB resources mapped to VELS.

The Department also worked with the tendered company to develop a website to support the trial. The website provides:

- Information on research and development
- Free lesson downloads
- Website links to IWB resources
- School case studies
- Online teacher forums
- Access to professional development
- Metropolitan and regional teacher user groups
- Online advice, support, training and resources.

Teachers whose initial use of the IWBs had been discouraged by the initial challenge of learning to use IWB software were either not using the IWBs at all, or perhaps using the boards once or twice per week as a maximum and for non-interactive purposes such as screening DVDs or powerpoint presentations. Teachers whose use of the IWBs had not been similarly discouraged said that they kept the IWB on all day and that it was actively in use for approximately 50% of the time. Students in these classrooms were using the IWB as much if not more than teachers. This was particularly powerful in the Special Education schools, where the IWBs were seen as an invaluable aid to teaching.

The second factor – access to appropriate, high-quality interactive teaching resources – was indirectly related to the first. In those schools where teachers had not been discouraged by perceptions of burden related to making their own interactive teaching resources, many teachers had instead developed comprehensive libraries of interactive teaching resources that were readily accessible to be downloaded from the internet. Many of these resources had been specifically designed for Primary school students, who were very responsive to them. Many were also being used in the Special Education schools with great enthusiasm and enjoyment by students and teachers.

By contrast, the Secondary teachers did not have similar ease of availability of suitable interactive teaching resources for use with their students, and the visual kinaesthetic activities that were highly valued by teachers in the Primary context were seen by teachers as less useful for Secondary teaching. Secondary teachers would benefit from advice and support in locating appropriate, targeted interactive teaching resources suitable to KLAs and age groups.

It should also be noted that, where teachers' confidence and enthusiasm for using the IWBs was first established by the use of easily accessible, high-quality teacher resources, many teachers had later progressed to using some of the IWB software functions. These teachers noted, however, that they saw little reason to laboriously create their own interactive materials when they could download something as good, if not better, from the internet.

The third factor – easy and convenient access to an IWB – was a determinant of how quickly teachers became confident in their use of the IWBs. Teachers who had an IWB available to them all the time in their classrooms clearly used the IWBs more often, with more confidence and for a wider range of activities than teachers who had to share and timetable use of an IWB. As one Primary teacher responded “If it’s set up and ready to go we find a way to use it. If you have to plan, then it doesn’t get used.” Similarly, a Secondary teacher asked “Why wouldn’t you use it if you have access?”

In Secondary schools there was a barrier to use caused by the time teachers needed to spend at the start and end of every class setting up and dismantling their laptops and calibrating the boards in order to use the IWBs. The need to recalibrate the board was an unnecessary impediment to their use. Some form of management of equipment, such as provision of dedicated PCs, could obviate this.

The situation was similar for teachers in open-plan Primary classrooms, where use of the IWB had to be shared, negotiated and timetabled with other teachers, and time had to be spent finding cords, setting up laptops and calibrating the boards before they could be used. Several schools had attempted to make the IWBs available to all teachers and students by locating them in shared spaces such as libraries or computer rooms, but this well-meaning strategy had unintended outcomes. Although it did not completely block the use of the IWBs, it was not the optimal arrangement for teachers to become confident in their use of the technology and was a deterrent to use that many teachers found difficult to overcome.

In both Secondary and open-plan Primary contexts where there were some teachers who had constant access to an IWB (e.g., where an IWB had been dedicated to a specialist teacher in ICT, art or music, or where some teachers had IWBs in their classrooms), those teachers said that they used the IWBs every day and for many activities. In the same schools, teachers who did not have convenient access to the IWBs responded that they used the IWB when it was available to them. In practice, this ranged from once a month as a minimum to three or four times per week as a maximum. The purposes of the applications also varied across schools and across teachers within schools.

In schools or classrooms where the teachers had developed confidence with the technology through convenient access, the students regularly and enthusiastically work on the IWBs. Where this was not the case, student access was limited. One Primary teacher pointed out that teachers needed to be confident with the technology and to use the boards themselves in order to be comfortable to let the students work on the boards. Students in Secondary schools were described as using the IWBs “not very much”, or “often to present work, but not often to learn from it”. In the Secondary schools and open-plan Primary classrooms, dedicated PCs would be a practical solution to the problem of accessing the IWBs, and several of the schools are now considering this solution in preference to teachers using their own laptops where IWBs are a shared resource.

***What were the conditions that supported or acted as barriers to the use of IWBs by teachers and students?***

The importance of differences between school contexts – Primary, Secondary or Special Education – was clear. In most instances, the responses of teachers from these three quite separate teaching contexts have been presented independently. Teachers’ responses, listed in order of frequency with which each form of support, resource or barrier was mentioned by teachers, are summarised in Tables 1 and 2.

Table 1. *Teachers’ perceptions of the support and resources needed to improve use of IWBs for students and teachers in Primary, Secondary and Special Education schools.*

<b>Support and resources needed to improve use of IWBs for teachers and students</b>		
<b>Primary Schools</b>	<b>Secondary Schools</b>	<b>Special Education Schools</b>
A resource bank of high quality teaching materials matched to VELs and priorities for teaching and learning.	Dedicated PCs rather than having to set up and calibrate laptop at start of every lesson.	Resource bank specific to the Special Education context, targeted to student needs.
Peer mentoring, time for training and professional development specific to use of the IWB in teaching	Better methods of timetabling and giving access to the IWBs.	Support from more experienced teachers on ways to use IWBs to improve outcomes for Special Education students.
Safe and stable steps to improve access for younger students.	Resource bank of materials appropriate for teaching Secondary students.	Method of overcoming shadowing (e.g., rear projection). Students in Special Education have particular difficulty in understanding the relationship between their own bodies and the projector as a light source.
Upgrade of ICT resources, including computers, scanners, server.	Support and advice from more experienced peers, with good examples of use of IWBs to teach Secondary school students.	Technical support to improve confidence of new users of the technology.
IWBs in every classroom, rather than shared between teachers.	Technical support to check for faults and to improve confidence for new users.	
Technical support to minimise teacher frustration, especially when just beginning to use the IWBs		

Across all types of schools, the teachers agreed upon the need for resource banks of high quality materials suitable for use with the Interactive Whiteboards, and teachers in some schools were working collaboratively to build bibliographies of useful internet sites and resources. The Department of Education and Training has also contracted two professional learning officers to work with teachers and has provided each teacher with a CD containing IWB resources mapped to VELs.

Teachers also expressed a common interest in learning more about pedagogy and IWBs. Teachers from Primary, Secondary and Special Education schools agreed about the importance of technical support for new users of the IWBs, to overcome initial concerns of teachers about lack of expertise, and some schools had successfully built this into their program of support for teachers. Primary school teachers also talked about the need to upgrade computer equipment such as laptops and servers, and to add new technology such as scanners, to get the most benefit from the IWBs. In the Secondary schools, dedicated computers were seen as a prerequisite for improved access to and use of the technology, while teachers in Special Education schools mentioned specific problems related to shadowing on the boards.

After installation a number of schools raised concerns regarding the height and accessibility of the IWBs for students. As a part of the research and development trial, an offer was made to all IWB Trial schools to have their boards lowered at no cost. Three schools chose to have all their boards lowered. This take up figure may be low due to other schools investing in alternative solutions such as steps.

Table 2. *Teachers' perceptions of the barriers to use of IWBs for students and teachers in Primary, Secondary and Special Education schools.*

<b>Barriers to use of IWBs for teachers and students</b>		
<b>Primary Schools</b>	<b>Secondary Schools</b>	<b>Special Education Schools</b>
Positioning of IWBs – too high or in rooms with too much glare. IWBs have been installed directly over existing whiteboards and young children cannot reach them without steps.	Lack of convenient access to IWB in all classrooms means that teachers must timetable use, set up and calibrate at start of lesson, and often simply do not bother.	Technical difficulties and equipment failure without adequate support from supplier.
Lack of time to learn how to use the IWB software, perceptions of burden and inadequacy that have discouraged use.	Lack of time to develop own resources on IWB software, and unsure how to find appropriate teaching resources for Secondary students.	Some IWBs placed in rooms with too much light, or too high for students to reach them safely. This is a particular problem for students who are visually disabled or have motor difficulties.
Insufficient access to IWBs – sharing too few IWBs between too many teachers has meant that no teacher has become really competent with the IWB.	Laptop computers too old to run the IWB software.	
Technical difficulties and equipment failure, coupled with poor service support from the supplier.	Technical difficulties and problems with equipment deter use.	
Inadequate computers and other technology (servers, scanners, etc.) needed to support use of the IWBs.		

***What were the IWBs being used to do that differed from usual teaching practices?***

Teachers were asked about the teaching and learning practices and activities they were using with the IWBs, with an emphasis on the sorts of activities that they could not incorporate into their classroom work if they did not have access to an IWB. Table 3 summarises responses from teachers across the Primary, Secondary and Special Education schools, ordered according to the frequency with which they were suggested by teachers.

Table 3. *IWB teaching practices and activities in Primary, Secondary and Special Education schools.*

<b>Teaching practices and activities using the IWBs</b>		
<b>Primary Schools</b>	<b>Secondary Schools</b>	<b>Special Education Schools</b>
Internet-based interactive learning activities.	Model ICT skills to whole group.	Internet-based interactive activities from BBC Schools or Priory Wood, etc.
Internet research as a group activity.	Model research skills, summarisation and note-taking skills, and problem-solving activities.	Model ICT skills to whole group – students learn a new program and then show each other on IWB.
Model ICT skills – whole class teaching of programs such as Kahootz or Powerpoint, research skills.	Practical work such as entering and graphing results of experiments on screen.	Morning circle activities in which child touches his or her photo on screen and a favourite piece of music is played.
Whole group focus for teaching new concepts using videos, simulations, and modelling.	Play CDs that accompany text books and use activities and simulations.	Scan activities as an alternative to work sheets, and complete as a group activity on the IWB.
Demonstrations using movement, colour, music, of concepts that cannot be easily presented in static print form.	Research on the internet as a whole group activity.	Offer more opportunities for social interaction, including turn-taking, respect for other's opinions, talking in a group, using highly motivational activities that retain student interest.
Visual presentations as an enrichment activity and alternative to excursions (especially in rural or lower SES schools).		Students produce digital portfolios using the IWB.
		Printed and laminated materials have been scanned into IWB – saves on photocopying and preparation of teaching resources.
		Extend many normal teaching activities, because they are more colourful, interesting and attractive to students.

The most common response from teachers was that the IWB was a useful tool for teaching that should ideally be available “as needed” and incorporated seamlessly into the flow of teaching. The production of an “interactive whiteboard lesson” was not seen as the most creative or appropriate use of the technology, as for many Primary teachers it smacked of an overly rigid, teacher-focused pedagogy. Rather, Primary and Special Education teachers described the IWBs as a “tool like any other” that could be brought into play as and when appropriate to support teaching and learning.

The usefulness of the IWB as a tool for modelling ICT skills was commonly noted across all types of schools. Primary schools and Special Education schools both placed emphasis upon internet-based interactive resources from popular websites such as BBC Schools, Number Gym, E Chalk, Top Marks or Priory Wood, with Special Education teachers particularly mentioning the connection between IWB activities as motivational tools for student participation and as opportunities for students to practise and improve social skills.

In one of the Primary schools with a very high proportion of students from home backgrounds in which English was not the first language, the teachers made particular mention of the importance of visual material to support students’ understanding. It was, they said, a “wonder and awe thing” for their students to see things they might otherwise not have an opportunity to experience. Teachers from rural schools also emphasised the use of the IWBs and internet resources to overcome barriers of distance and lack of exposure to a range of experiences for their students.

In the Secondary schools, the IWBs were largely used for organising and displaying information to the whole class, and for modelling skills in ICT use, research, note-taking and summarising. They were valued by teachers as an excellent way to display student work, and acknowledged as a motivation for better quality work from students.

### ***How did the use of IWBs influence teachers’ ideas about teaching?***

When asked about the impact of IWBs on their ideas about teaching, most teachers in Primary and Special Education schools talked about their increased awareness of visual kinaesthetic learning, opportunities to bring exciting visual learning materials into the classroom, and improvements in feelings of professionalism in general and interest in using ICT resources in particular. Many Primary school teachers talked about spontaneity and opportunities to shift the emphasis away from the teacher and onto learning as a social activity between students. Teachers were appreciative of the high quality of teaching materials that could be downloaded from the internet, opportunities to share teaching materials and ideas, and to save time on production of teaching resources. A dedicated scanner in the classroom was seen as particularly useful in terms of saving time and paper resources. Primary teachers also spoke about their feelings of increased professionalism and knowledge about ICT.

The impact of using IWBs on ideas about teaching is summarised in Table 4 for teachers in Primary, Secondary and Special Education schools.

Table 4. *Influence of IWB on teachers' ideas about teaching in Primary, Secondary and Special Education schools.*

<b>Influence of IWB on teachers' ideas about teaching</b>		
<b>Primary Schools</b>	<b>Secondary Schools</b>	<b>Special Education Schools</b>
Shifted emphasis from printed material, drew attention to use of visual kinaesthetic learning.	Increased awareness of importance of getting students to interact with each other.	Reinforced awareness of the importance of visual kinaesthetic learning.
Opened opportunities to introduce new and enriching experiences.	Teachers felt more interested in using ICT. Use of laptops increased among teachers using the IWBs.	Broadened opportunities and made teachers think more carefully about how to present information to make it more interesting and attractive for students.
Improved spontaneity in teaching. Supported teaching as a dialogue between teachers and students by providing immediate opportunities to follow up on students' ideas.	Motivated to build a repertoire of high quality materials that could be used on the IWB, stored for use in following years, and shared with other teachers.	Motivated searches for better teaching and learning materials.
Improved ability to prepare and share resources efficiently.	More aware of opportunities to turn individual activities into group activities for brainstorming and discussions.	Sparked discussion and sharing of useful ideas and materials between teachers.
Increased teachers' thinking about the optimal presentation of information and the ways that children learn.	Shifted from photocopying materials to more spontaneous use of internet searches in direct response to student interest and discussion.	Teachers have converted many normal teaching activities to the IWB because of increased student interest.
Increased teacher workload in the short term, with more reliance on laptops and working at home to prepare materials	Interested in impact on quality of students' creative work and presentations when they know they will be displayed on the IWB.	Noted that there has been a transfer of ICT skills from the IWBs to other technology. Use of computers increased because of the IWBs.
Improved teacher ICT skills and confidence, and increased motivation to use other ICT resources and awareness of the uses of ICT for teaching.		
Awareness of improvements in learning when students worked together as a group. The IWB promoted collaboration and discussion between students and took the teacher out of the activity.		
Teachers felt more professional, and able to offer more as a teacher.		
Reduced time spent on production and photocopying of materials.		

Secondary teachers who were using the IWBs, and some were not because of timetabling and access barriers, mentioned an increased interest in collaborative work between students and the potential of ICT in teaching. The impact of the IWB as a method of displaying student work was valued by Secondary teachers, especially in terms of improving students' presentation skills and their pride in the standard of creative work such as photography, graphics, animation and film production.

In the Special Education schools, the teachers were strongly motivated to develop good resource banks of materials that could be used with the IWBs and shared with other teachers, and were very enthusiastic about the potential of the IWBs for working with their students. The specific and immediate increases in responsiveness of the students, many of whom were described by teachers as difficult to motivate with any other activities, acted as a powerful impetus for the teachers to convert existing activities to use on the IWBs.

### *What were the students using the IWBs to do?*

Teachers were asked about the opportunities that their students had to work on the IWBs and the sort of activities for which they used the IWBs. Frequency, style and range of student use of IWBs were all strongly linked to teachers' access to and confidence with the technology. This was particularly noticeable in the Primary schools, where some teachers had convenient access to IWBs in their classrooms, a wide range of interactive resources and good technical support for their use of the IWBs, and some did not. For this reason, Table 5 presents information about students' use of the IWBs in four categories:

- Primary students of teachers with good access to IWBs, resources and support;
- Primary students of teachers without good access to IWBs, resources and support;
- Secondary students of teachers who predominantly did not have good access to IWBs and appropriate teaching resources; and
- Special Education students of teachers who predominantly had good access to IWBs.

The contrast between schools where teachers did or did not have easy and convenient access to the IWBs and good interactive teaching resources was stark. Most of the Secondary teachers and many of the Primary teachers without convenient access to the IWBs responded that their students used the IWBs primarily as an alternative to a data projector and screen or other audio visual equipment. By contrast, Primary teachers with good access to an IWB and Special Education teachers responded that their students used the IWBs for an extremely wide range of collaborative group and individual activities limited only by the age group or functionality of the students.

Table 5. *Student use of the IWBs.*

<b>Student activities using the IWBs</b>			
Primary, good access	Primary, poor access	Secondary, usually poor access	Special Education, good access
Use a wide range of interactive literacy and numeracy games. Constantly in use for group activities, games in which they try to improve their scores, helping and advising each other.	Research on the internet as a shared, group activity.	Present their work (powerpoint, movies, animation, graphics)	Use a wide range of literacy and numeracy activities and games,
	Watch DVDs, listen to music.	Enter data from experiments into database as a shared activity.	Touch pictures or icons in cause and effect activities (e.g., morning circle, where students touch their own picture on screen to hear a favourite song, or activities where students touch an animal picture and hear the corresponding noise)
Share work and brainstorm ideas using ICT (e.g., Kahootz). Showcase their work on ICT and explain to other students.	Cloze activities	Use worksheet or instructions displayed on IWB as a reference point.	
Research on the internet as a shared group activity.	Use hand writing, colouring, timer and Venn diagrams from the IWB software.	Play interactive strategy games.	Research on the internet alone or in groups.
Present work on powerpoint, Kahootz or scanned and displayed on IWB. Noticeable improvements in student pride and effort when work is shown on IWB.		Work on activities from CDs that come with textbooks.	Scan in their work to share with others, or type information into computer and show on the screen.
Watch DVDs, listen to music.		Explore simulations downloaded from internet.	
Make electronic books.		Take part in group work on research, summarising, note-taking.	Make digital portfolios by scanning in work, adding powerpoint presentations and photos.
Explore simulations.			
Use computer programs – even the older style programs are more attractive to students when displayed on the IWB.			Present their ICT work, using powerpoint, Kahootz and Word.
Use digital camera and microscope			Watch DVDs, listen to music, play games.
Participate in yoga, pilates, fitness and dance activities shown on the IWB.			

***How did the use of IWBs in teaching impact student interest and participation?***

The impact of the IWBs on student interest and participation was directly related to the teachers' access to the technology and their confidence to use the boards. Where teachers were using the IWBs infrequently and for a circumscribed group of activities, they tended to speak about the attractiveness of the large screen for presentations but to hedge their comments by conceding that they had not noticed much change because the IWBs had not been in regular use.

Where teachers were making frequent use of the IWBs, however, their descriptions of change in student interest and participation were enthusiastic. The following comments were made by Primary teachers in schools where the IWBs were in frequent use:

“On the first day of school, it was usual to have 50 to 60 students not turn up. This year it was six”. (Assistant principal of a school with very high proportion of students from disadvantaged home backgrounds)

“The bell went this afternoon, and none of the students moved because we were working on the IWB” (Grade six teacher).

“We used ‘good morning’ activities with smiley faces on the IWBs to address a problem with lateness. This had a major effect on students, who were motivated to get to school on time. The children are always asking if they can ‘have a go’ next on the IWB. Modelling activities on the IWB means the students are more focused, get hold of new ideas more quickly. Their enthusiasm has not waned at all” (Grade three teacher).

“If the IWB is on, the children sit closer, face the board and are more attentive and for longer. It has a similar impact to reading a really good book to the class” (Grade one teacher).

“It certainly grabs the children’s attention. Concentration is for longer periods and more focused, through the whole school. Even with a relatively bland research skills project, surfing the internet, the student interest was very good.”

“There has been an immediate result in terms of student confidence and willingness to share work with each other. The students are empowered because they are in control of the IWB. All students can see, and share a common experience. It’s approachable, non-threatening, fun”.

The following comments were made by teachers in Special Education schools:

“It’s big, loud and colourful – a real positive. Students who are not motivated by other things are attracted by the IWB. It’s also a great reward for work on other programs. We use it for morning activities, and students are activating the programs themselves. This is very rare for some students who do not usually initiate anything. Students seem to have much longer attention spans – two to three times longer for similar activities when they are transferred to the IWBs.”

“Students are more enthusiastic about learning, more motivated and engaged. Their eyes light up when the IWB goes on. One student said that she wanted one for Christmas”.

“Students are asking to use the IWB at lunchtime. All students take chairs and sit in front of the blank screen, waiting for the IWB activity to start. The students are more self-directed and less aggressive when they use the IWBs” (teacher of teenage boys with autism).

***How did the use of IWBs in teaching impact the learning of sub-groups of students?***

In addition to a common interest across schools in the potential impact of IWBs on student engagement in general, many schools were also keen to explore the utility of the IWBs for working with sub-groups of students. Schools were interested in gender differences in responsiveness to the IWBs, and in the potential of IWBs for improving outcomes of “at risk” or disadvantaged students or students with disabilities (Table 6).

The Special Education schools had been keeping individual case study records to document the usefulness of IWB for students with particular disabilities. They had pre-selected students, who they thought would benefit most from the technology, to take part in the evaluation. However, Special Education teachers were surprised and pleased by the responsiveness of *all* their students to the IWBs and, while maintaining their case study records on individual students for the purposes of the evaluation, have now shifted to including all students in IWB activities.

Teachers in Primary and Secondary schools had expected IWBs to have most impact on the learning and attention of boys, and on boys who were not responsive to print-based materials in particular. While this has been the case, teachers have been struck most particularly by the impact of IWBs on students who were shy, withdrawn and inarticulate. It seemed that the attractiveness of the IWB activities was especially helpful in motivating these students to overcome their reluctance to speak in front of the class or participate in group activities.

Table 6. *Impact of IWBs on sub-groups of students in Primary, Secondary or Special Education schools*

<b>Which students changed as a result of working with IWBs? How did their behaviour change?</b>		
<b>Primary Schools</b>	<b>Secondary Schools</b>	<b>Special Education Schools</b>
<p>Shy children, and especially shy underachieving children, were much more willing to participate in IWB activities. This was mentioned by almost all teachers. Children who had not previously spoken were speaking up in class. Even children with speech and language difficulties were eager to take part in IWB activities because they were attractive and non-threatening.</p> <p>Boys were strongly engaged. In some schools, it had been necessary to divide students into gender groupings so that boys did not exclude girls from working on the IWBs. One teacher said that the boys were “too engaged”.</p> <p>The attractiveness of the IWB activities had also increased girls’ interest in working with ICT.</p> <p>IWBs had been used to good effect with groups of students with behavioural problems (e.g., aggression, social difficulties). They encourage sharing, collaboration, taking turns, and students helping other students. Exclusion from use of the IWB has been used to modify poor behaviour.</p> <p>Students on disability programs have had positive benefits from the IWBs. For example, they were useful for working with students with visual impairments because of the size of the display and ability to manipulate the size of the text.</p> <p>Students in isolated rural schools or from disadvantaged home backgrounds were seen as gaining particular benefit because the IWB allowed many new experiences to be brought into the classroom in an attractive visual way.</p>	<p>Boys were very keen to use the IWBs, and in particular the students who were usually less motivated or more passive learners than other students.</p> <p>Students with anger management problems showed improvement. Teachers used team teaching and the IWBs to improve the level of engagement for a group of difficult students. They believed that the visual and auditory stimulation and opportunities to move around were helpful for working with this group.</p> <p>Quiet and shy students were more comfortable when making presentations using the IWBs because it drew attention away from them and they felt less vulnerable.</p> <p>Inarticulate students were motivated to ask questions by things they had seen presented on the IWBs.</p> <p>Most students were producing better quality work if it was to be presented on the IWB.</p>	<p>All students have been responsive. This has surprised teachers, who expected some students to gain more benefit from the IWBs than others. However, this has not been the case.</p> <p>Even the students with high needs have enjoyed watching materials shown on the IWBs because of the large screen, colourful displays and movement.</p> <p>Students with autism or problems with social integration responded particularly well to the IWBs and were gaining practise in social skills as highly motivating ICT activities and games were transformed into group activities on the IWBs.</p>

***What problems were encountered during installation of the IWBs [and how did these affect the use of the boards]?***

The installation of the IWBs proved a challenging process for some of the schools, and the teachers hoped that their experiences could be used to improve installation procedures and decision-making for other schools. Schools were encouraged to trial alternative IWB installation locations, including multiple boards within a classroom and installation to the side or back of a classroom. All installation locations were chosen in consultation with the school principal and with few exceptions most schools chose to install their IWBs at the front of each room. Common sources of teacher dissatisfaction with the installation of the IWBs are listed as follows:

- Installed too high for safe use by students
- Installed in rooms with too much reflected glare
- Incomplete, staggered installation (sometimes over four weeks) caused frustration for teachers
- Faulty projectors, speakers and cords took weeks and many phone calls to be replaced or repaired
- Projector was installed in front of airconditioners or fan - vibration caused problems so they could not be used on hot days
- IWB installed in front of heaters in prep classroom was unsafe to use on cold days
- Schools with asbestos problems experienced difficulty getting support or advice
- Cords were too short, so many schools needed to purchase extension cords and were concerned about tripping hazards
- Installed over a cupboard door, so needed recalibration when cupboard was opened
- Installed in portable classrooms, so needed constant recalibration because of movement
- Software chosen to accompany the IWBs was difficult to load onto computers, and impossible for teachers with Mac laptops

***What would schools like to change about the way the IWBs had been installed?  
What advice would teachers like to give to other teachers about installation of IWBs?***

The teachers had learned from their experiences regarding the installation of the IWBs, and wanted to make this known for future installations in their own and in other schools. In particular, teachers made the following comments:

- Schools need to be ready to invest in the additional technology and support to make sure that the IWBs work properly. This includes computers that are sufficiently powerful, speakers (which are essential), scanners, server, technical support and time for teachers to learn about the IWBs. It also includes blinds in some rooms, to minimise glare, safe and sturdy steps for young children, and power sockets and cables positioned to suit the optimal placement of the IWBs in classrooms.
- Try to install one in every classroom as an optimum. Shared IWBs do not get used as often as IWBs located in the classroom, for a wide range of logistical reasons. However if one per classroom is not an immediate option, to allow everyone to “get a go” on the IWBs, it may be better to “hothouse” them with a smaller group of teachers who are interested and who have continuity of use, and then gradually increase the number of IWBs in the school.
- Invest in dedicated PCs and splitters in situations where sharing of IWBs is unavoidable.
- Mount them on solid walls, away from glare and sources of vibration and movement.
- Introduce IWB software programs only after teachers have become confident in their use of the IWBs for teaching. This can help reduce the perception of an overwhelming and complicated process for teachers. Instead, start with resource packages of suitable IWB materials, and encourage teachers to use the IWBs in any way they like as they build their confidence.
- Special Education schools might consider investing in screens with rear-projection, because of frustrations for students caused by shadowing from projector.
- Many teachers would have preferred IWBs to be installed away from the traditional whiteboard, and especially in Primary schools at a height suitable for the teacher and children to use. Advice from the Department of Education and Training compiled from experienced schools with IWBs would be very useful.

By and large these issues could be considered to be teething problems and can be readily addressed in future installations. While many of them would have affected the teaching and learning programs, these issues were not yet apparent or able to be explained. Details of the problems that were not expected by teachers are provided in Table 7.

Table 7. *Problems associated with using IWBs in Primary, Secondary or Special Education schools*

<b>What were the problems associated with the use of IWBs by teachers and students?</b>		
<b>Primary Schools</b>	<b>Secondary Schools</b>	<b>Special Education Schools</b>
Issues related to the height of the board, positioning of furniture, brightness of the display, heat generated by the board, trailing cords.	Frustration with time spent setting up and calibrating the IWBs. Set up and pack up time eats into teaching time too much.	Frustration of shadowing across boards for students.
Additional and ongoing costs such as speakers, cables, server upgrade, scanners, blinds to minimise glare, computer and laptop upgrades.	Time needed to learn how to use the new IWB software, and difficulty of using the software. Software is incompatible with Mac computers.	Difficulty of overcoming access barriers for students in wheelchairs or with reduced mobility.
Frustration of trying to learn how to use new IWB software, and difficulties with the program 'freezing' and losing work.	Lack of interest by other teachers.	Technical problems, equipment malfunctions and poor service from supplier.
Frustration of technical problems and faulty equipment.	Over-competitive students - especially boys - dominating other students' use. High achievers can be difficult to control.	
Incompatibility of IWB software and Mac computers.		
Resistance to new technology by some teachers.		
Reduced flexibility of floorplan in classroom.		
Installation took much longer than expected.		
Not suitable to use as a standard whiteboard – surface is not easy to clean.		

***What were the unanticipated benefits associated with the use of the IWBs?***

While most teachers were expecting the technology and IWB software to support their teaching and learning they also experienced ‘surprises’. Some of these are outlined in Table 8. From Table 8 it can be seen that the improvement in professionalism, engagement of students and the ease of use once the teacher became familiar with the technology were mentioned frequently by teachers. There were also surprising areas of learning that were found to be more conducive to the use of the boards than others.

Table 8. *Unexpected benefits associated with IWBs in Primary, Secondary or Special Education schools*

<b>What were the unexpected benefits associated with the use of IWBs?</b>		
<b>Primary Schools</b>	<b>Secondary Schools</b>	<b>Special Education Schools</b>
Improved cooperation and sharing between students.	Value for modelling skills was better than expected.	Surprised by the positive reaction of <i>all</i> students, and excited by the potential of IWBs for working with students with disabilities.
Improved social confidence and presentation skills of students.	Shifted focus from the teacher to the students.	Strongly encouraged to learn more by the excitement and enjoyment of the students – very rewarding for teachers to see the benefits for the students.
Improved immediacy and responsiveness in teaching through ability to research online as and when needed.	Students had a sense of pride and feeling that an investment had been made in their learning.	They provided opportunities for students to demonstrate abilities that were not easy for them to show without the IWBs.
Heightened sense of professionalism among teachers.		
Value of IWBs for projecting a positive image to the community and lifting school morale. Seen as an opportunity to show students and parents that the teachers are prepared to learn new things. A source of pride for many schools.		
Strengthened collegiality in the school because the IWBs and their use became a common platform for discussion and sharing ideas and resources.		

***What did the IWBs do that increased learning? What did the students learn through the use of IWBs that they might not or would not have learned before (or how has the use of the IWB helped them learn faster)?***

This question was not generally addressed, but will be a central part of the remainder of the evaluation.

Despite the evaluation framework being provided and goals and learning objectives being set out in their evaluation plans, it became clear that many teachers had not yet addressed this question. The early timing of the visits to school has meant that teachers and schools have not yet had time to address learning directly or to focus on their targets and performance issues. In general, early evaluations are often bedevilled by teething issues and early surprises and this evaluation is no exception. By the end of term three or term four the early period may have passed and a more substantial examination of the goals and targets for learning through, with and about IWBs and their use in the classroom undertaken.

Learning has first focused on *how* to use the IWBs and the applications that came with them. As teachers and students become more familiar with the equipment, it is likely that questions of learning advantages and engagement will become central to their thinking. The evaluation will attempt to maintain the focus on learning and engagement rather than on the technology itself in the next phase of the evaluation.

### ***Conclusion***

There were several conclusions that could be drawn from the foregoing discussion. However, the amount of time that the IWBs have been in schools needs to temper any conclusion about the efficacy of the boards, their effects on learning and certainly about the early issues and difficulties that might be experienced. This is natural and later discussions with school will provide much more reliable data about the IWBs and their effectiveness on learning outcomes.

1. Schools varied in their implementation of the technology and in many instances early difficulties had hampered their effectiveness. However, this is seen as temporary and a result of early 'teething' troubles.
2. There was not yet a clear focus on learning or on gathering evidence of learning advantage at this early stage of implementation.
3. The IWBs were more easily installed in PC-based schools. Mac-based schools experienced initial difficulty in using the software chosen to accompany the IWBs, which discouraged some teachers from using the IWBs.
4. Location and installation issues have to be addressed in advance of the implementation, and many positive lessons can be learned from this early experience.

5. Calibration of IWBs is important and needs a relatively stable environment. It is important to avoid the need to regularly change the computer used to drive the boards.
6. Professional development needs to be provided by advisors other than and in addition to the providers of the commercial applications. As experience grows, successful teachers need to be employed to mentor others across schools as well as within schools.
7. An increased emphasis needs to be placed on the evidence of the effectiveness of the boards for enhancing learning and engagement.
8. Teachers need to provide critical notes on the efficacy of training and the provision of materials.