Research Results

Interactive Whiteboards and their practical use within the primary classroom.

It would seem that this is a particularly appropriate investigation since there seems little doubt that interactive whiteboards are going to be an increasing feature in the primary classrooms of the future. To reinforce this point I would refer to the following quote taken from the NUT ‘Teachers in Wales’ dated April 2002:

“The Assembly has announced plans to make £9.9 million available to provide digital whiteboard and multimedia equipment for all schools in Wales.”

The areas that I wish to address in this report are:

- Costs – both immediate and long term
- Additional skills – training implications
- Practical considerations
- Particular subject areas that might benefit
- Advantages/Disadvantages

Due to the fact that we are looking at a recent technology there is not a great deal of literature available as yet in the form of published books. However there are a number of projects being undertaken by schools and Local Education Authorities and much of their reporting and recording is available on the Internet. Furthermore there are a number of official and quasi-official sites, BECTA for example, that contain relevant information. Therefore the bulk of the research that I have undertaken has been conducted via the Internet although there is some input from traditional texts and references made to a lecture that we received at UWIC under the auspices of the English Department.

COSTS

There are three elements to an interactive whiteboard system and each requires careful consideration. There is the whiteboard itself, a data projector and a computer, typically a laptop. We shall now consider each of these items individually starting with the laptop computer.
**LAPTOP COMPUTERS**

There is an enormous range and choice in this particular market. Prices have dropped in recent years although it as well to recognise that you will pay a premium for the advantage of the portability and compactness of a laptop. Having looked at the requirements it would seem reasonable to expect to pay between £800 and £1500 for this piece of hardware. It is acknowledged that this is a large range – to simplify this report it may be sufficient to suggest that a machine purchased for £1100 will have the necessary specification to run the required software for the foreseeable future, perhaps 3-5 years? Longer term running costs should be minimal since computers are very reliable although replacement will eventually be necessary.

**DATA PROJECTORS**

This connects to the computer and projects the image onto the whiteboard. This is a rapidly changing area of technology and prices are falling however these items still command a high price.

The major issues to consider are **brightness**, measured in ANSI lumens. This measurement will generally range from 500 ANSI lumens to more than 1000 ANSI lumens – experience in schools thus far has shown that a medium size classroom with the lights on will require a brightness rating of 700 ANSI lumens. A lower rating will require the classroom to be dimmed in order for the projected image to be visible. The other factor to relating to the quality of the display will be the projector’s **contrast ratio**. This is a measurement of the darkest area of the image to the lightest – the higher the ratio the better. The cost of a suitable projector, given the above requirements will be between £1500 and £2500 – once again a large range, once more we shall adopt the policy of choosing a mid-range price of £2000.

The longer term running costs of a data projector may be considerable and relate in the main to one item – **replacement bulbs**. These are very expensive, typically £250 - £400. Vendors will quote typical bulb life for their projectors and these are usually in the range of 1000-6000 hours. It makes sense to switch projectors off when not in use and indeed many projectors have bulb/power saving features built in. It is recommended that you buy a projector with at least a 2000-hour bulb life.

**WHITEBOARDS**

There are relatively few manufacturers of these at present and therefore choice is limited. Bournemouth LEA have researched the major suppliers and produced a comparison table that I attach hereto marked as Appendix A.
TRAINING

The suppliers of the whiteboards all include training with the purchase of the equipment. This, combined with the teacher’s existing skills, should enable effective use of the whiteboard from the outset.

PRACTICAL CONSIDERATIONS

Think carefully about where the computer should be located. Although whiteboards have on-screen keyboards these are only really suitable for occasional, low volume input. Hence a real keyboard needs to be close at hand. Also it can be useful for the teacher to have the monitor (which is wired to show the same picture as on the whiteboard) facing them so that they can look at the class and still see the screen contents.

Internet connection is highly desirable. It allows resources to be shared with other classrooms and with the world at large. It also gives the teacher the flexibility to, for example, prepare materials on a PC at home, e-mail them to schools and bring them up on the whiteboard next day. Think carefully about where this network outlet is positioned in relation to the computer.

Suitable mounting area for the projector, if fixed mounting is desired. Mounting is usually on the ceiling and is best handled by the equipment suppliers. Whilst DIY may seem possible consider the health and safety issues arising from a weighty electrical device suspended in a position where pupils may be tempted to reach up and swing. In a professional installation the projector will be mounted securely to a strongpoint using suitable brackets. Power supply will be fed to a ceiling power outlet.

A wall area big enough to mount the board. Again, mounting is usually done by the suppliers who will also configure the computer software, and, for a fixed projector, synchronise the projector and board together.

VCR (optional). This will feed directly into the projector, which will act as a large screen television.

Adequate power supply - remember that exposed trailing cables are a hazard in the classroom

  i. The computer - usually one or two outlets, three if speakers are being used.
  ii. The projector - A fixed ceiling outlet with a wall isolator if the projector is ceiling mounted professionally.
  iii. The board - for some boards only
  iv. The VCR (if required)
SUBJECT AREAS THAT MIGHT BENEFIT

From research undertaken thus far there would seem to be a great deal of enthusiasm, in particular with regard the possibilities for the way the literacy and numeracy hours are taught. The concentration on their use in these two subject areas is likely to be because schools, in justifying their expenditure, will want to show a positive impact in the core areas. It should therefore be recognised that are likely to be benefits across the curriculum. However the following are some of the results thus far as reported by research being undertaken in Kent.

*There have been many uses in the Literacy Hour. Whereas a data projector alone enables the class to share a text, the whiteboard has allowed children to come up and select words, phrases and sentences that they feel need to be changed. Close inspection of pictures and maps has been enhanced by the zoom facility in the graphics software. At a touch, children were able to 'zoom' into an aerial photograph of the school. The boards have also been used to enable the whole class to view a PowerPoint presentation, CD-ROM or web site.*

*The whiteboard has been successful with interactive Numeracy software designed for whole-class teaching. Some of the titles on the NNS CD-ROM (Play Train, Monty) and web resources such as Ambleside's Big Count have been used particularly effectively, with enhanced engagement from the pupils.*

*A more successful group experience involved Year 6 pupils who had been set the task of designing a newspaper layout in Publisher. While text was entered at the keyboard, other group members stood at the whiteboard, to highlight errors, adjust pictures and refine the layout.*

**Summary**

The interactive whiteboard is an effective medium for teacher input to the whole class, and for reviewing the lesson. The teacher is able to present from the front, and is better positioned to observe pupils' response. The board has been used effectively in a number of subject areas. In particular, it supports interactive teaching in the Literacy Hour and Mathematics lesson. The board is an excellent resource for demonstrating new ICT skills. Children see the teacher pointing to a feature or making a selection, rather than the mouse pointer, which may be hard to see on a complex screen.

Further endorsement of interactive whiteboards comes from Keri Cole and Debbie Harteveld, a Headteacher and ICT Co-Coordinator from Tyr-Y-Berth Primary School who claim that they have transformed their teaching and helped to raise standards.
ADVANTAGES/DISADVANTAGES

Many of the advantages have been mentioned already in this report and on the basis of my research I would conclude that interactive whiteboards have the potential to be an extremely powerful tool for teachers.

Disadvantages, such as they are, are mainly of two types – practical, such as costs, physical installation, mobility etc. These are likely to be relatively easy to address. The second type of problem will be one of a resistance to change by staff. Many teachers will have been teaching successfully for many years and may see no need to employ new techniques. It is to be hoped that the benefits, once seen in other classrooms, will become so apparent that in time there will be an increasing readiness to adopt and embrace this particular presentation technology.

APPENDIX A

<table>
<thead>
<tr>
<th>Feature</th>
<th>SmartBoard</th>
<th>Hitachi</th>
<th>Promethian</th>
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<tr>
<td>Origin</td>
<td>Imported from Canada and resold in the UK.</td>
<td>Imported from Japan and resold in the UK.</td>
<td>Made by Promethean.</td>
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<tr>
<td>Resilience</td>
<td>The soft film may be more susceptible to damage but the sales people say not in their experience. Certainly it seems to sell well in schools. Accidental use of indelible pen can be removed using a non-abrasive cleaner.</td>
<td>Robust. Indelible pen can be removed with a non-abrasive cleaner. An overlay membrane can also be purchased to repair damage.</td>
<td>Robust. Indelible pen may leave a trace but this can be removed with an alcohol-based board cleaner.</td>
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<tr>
<td>Pens</td>
<td>Finger can be used as a pen. Coloured &quot;dry wipe marker&quot; style pens also provided. Removal of a pen from its tray switches it on.</td>
<td>Must use a special pen. (Replacement cost approx £130). Uses AAA batteries. Pen can be flipped over and becomes a highlighter. Right mouse click facility on pen also.</td>
<td>Must use special pens (two provided - £39 to replace). Pens are particularly slim-line and easy to use. Best of the bunch. Batteries not required.</td>
</tr>
<tr>
<td>Power supply</td>
<td>No external power supply required. Power is drawn from the RS232</td>
<td>Requires 13 amp socket.</td>
<td>Power is drawn from the RS232 connection into the</td>
</tr>
<tr>
<td>Pixel resolution - <em>i.e. how many sensitive &quot;dots&quot; cover the board. The more dots, the greater the level of detail that can be achieved with the pens.</em></td>
<td>Quite coarse.</td>
<td>Moderate.</td>
<td>Fine (200 dots per inch) - plus good scan/refresh rate.</td>
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**Software**

Included in the cost are the software drivers and an on-screen notes facility. Handwriting recognition and a basic on-screen keyboard included. For £145 extra comes a CD with customisable on-screen keyboards, Sherston Clipart, calculator, links list, "Smart Paper" and screen tools such as a protractor, NNS partition cards, etc. Somewhat like a cut down version of RM's EasyTeach. For secondary phase there is "Boardworks", a developing library of stock slides by subject area at £499 per subject.

Comes with drivers and notepad software as standard. Notepad software which is better than that provided with the Smart Board. It includes tools for grids, masking, zoom, shape drawing, line drawing and connecting.

Standard software is vastly superior to the competition. Individual user profiles of settings can be called up rather like an MS Windows desktop. Teachers can start in beginner mode and add more complex features as required. Teaching materials can be stored as "flipcharts" with graphics, hyperlinks, etc. Subject content "flipcharts" provided at £200 per subject unit. There is some school based evidence that teachers find the software quite complex at the outset and tend to only use a small subset of the facilities. "Boardworks" is also available as per the Smart Board.

**Extras (chargeable)**

Infra-red tablets which allow pupil input to be "beamed" onto the board.

Synchroneyes (£575 per room) allows pupils screen to be frozen, viewed by the teacher and presented on the interactive whiteboard.

Infra-red "pad" which allow pupil input to be "beamed" onto the board. £600. Radio based interactive class voting system available @ £2,500 for a pack of 30 devices.

**Support**

Unlimited on-site training can be provided free via trainer with teaching experience.

On site training included in the price for groups of 2-3 teachers. Hotline also available.

Hotline available. Training provided at a cost or free to groups of schools.

**Guide Price**

- Not including any bulk purchase discounts.
- Exclusive of VAT. For a

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<td>£3,495</td>
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specification of at least the following:

- 700 ANSI Lumen projector
- 70" whiteboard, including ceiling installation
- One year on site support for both board and projector
- Delivery

**Overall**

**Strengths** - Simple to use. Ability to use finger as a pen is a significant feature.

**Weaknesses** - Robustness of the screen membrane may worry some. Low but acceptable resolution.

**Strengths** - Reasonable robustness and good software package. Good resolution.

**Weaknesses** - Need for power supply and batteries.

**Strengths** - Excellent software package. Robust board. Good resolution.

**Weaknesses** - Software might be complex for the beginner.

**The winner?**

Based on the above there is no clear “winner”. The Promethean board is clearly of the highest quality but at a price. The other two boards are simpler. The Smart Board is very easy to use with literally fingertip control but some would question robustness. The LEA is not therefore making an overall recommendation, rather offering the above information for schools to make a judgment within their own context. Pricing is obviously a big factor and these are changing all the time so it is as well to check the latest offers. The LEA intends to contact schools in an effort to broker bulk purchases of specific packages to help minimise costs.