# How does the Interactive Whiteboard affect children's attention?

*Mary Carney*

**It's a Saturday afternoon in June, in a Hong Kong language centre. A group of 12 year old Hong Kong Chinese learners are sitting quite still in a semi-darkened classroom. Some fidget. Most look straight ahead, blinking at an enormous screen of projected light. The only sound is the low hum of a projector and a video camera. I reach for the light switch…….**

Many now look despondently down at sheets of blank paper and potentially today's biggest challenge: remembering the order in which they have just read aloud, and silently, 7 collocational phrases from an interactive whiteboard. The recall in writing begins. Girls finish

quickly. Boys (it seems) take their time. All pass me their papers. The entire episode has lasted 4-5 minutes. Vocalising. Reading. Recalling. Writing. From a bright screen. In a darkened classroom. Tiresome as it sounds, the test constituted a very minute part of a series of thematic lessons, and a large part of a Masters research dissertation on University of York's MA in TEYL.

## The research question

This article is adapted from a paper published by University of York (2006) which described the findings from a study which I carried out in 2004 into whether attention to language read from an Interactive Whiteboard (IWB) with classroom lights switched off, produced more accurate recall in two groups of 22 12 year olds than the same test used with a traditional whiteboard (TWB) with all classroom lights switched on. Ultimately, I wanted to know how, if at all, classroom lighting, particularly the projected light of the interactive whiteboard, affected children's attention.

## Lighting and learning

Where did it all begin? Around 70 years ago, it seems. The role of lighting in classroom performance is documented in US studies from the mid-1930's, many upholding appropriate use of classroom lighting's role in reducing off-task behaviour, improving test scores and upping overall achievement.
The effects of light therapy (light strengths and colours) on child dyslexia, learning difficulties, poor concentration and performance in US mainstream teaching contexts are also documented, many studies equating "good" lighting (i.e. well lit) with "good" learning. However, one study carried out in US schools in the late 1950's, which looked at the relation between visual tasks and how lighting levels affected task performance, concluded that an identical amount of light was required to perform any visual task of equal difficulty (Cooper 1958 in Ferenczi 1997).

Recent UK studies appear not to have focused specifically on the effects of the IWB's light, although, distraction has been studied in IWB-using children with multiple learning difficulties (O'Sullivan 2004). The distractibility of over-emphasis on the IWB presentation process in UK Primary learners (Cogill 2003) has also been noted.

## Lighting and affect

Various affective disorders such as binge eating, depression, SAD (seasonal affective disorder), Alzeimers, jet-lag, and shift-work insomnia, have been treated by light therapy. For example, indoor dim lighting has been found to curb inhibitions in teenagers, to the extent that it encourages binge eating (Kasof 2002). Studies using dawn simulation lights woke teenagers from their sleep more easily (Terman 1996; Brainard 1997). Bear in mind many of these experiments were carried out 50 years ago, when knowledge, and range, of electric lighting (and electronic equipment in general) was more limited than now. What may explain some of these studies' outcomes, is the brain's pineal gland, which is affected by light.

## The effects of light on the brain

The hypothalamus – the nerve centre for primitive physical and emotional behaviour – receives and sends light/dark information, via the retina and nerve impulses, to the pineal gland. When light does not stimulate the hypothalamus, melatonin – a hormone derived from serotonin which controls the sleep/wake (circadian) cycle - is released. Light, used sensitively, it seems, can lower inhibitions and affect mood. The ancient Greeks believed the pineal gland was our link to the realms of thought – Descartes even called it the 'seat of the soul'. However, despite over 2000 years of awareness of the link between the pineal gland, light, and thought, no clear, satisfactory physiological or biochemical theory appears to fully explain the mechanism by which bright, or dimmed, light works on the brain. Given this dearth of physiological evidence, I adopted skepticism from the outset.

## Children's attention

I studied the attention levels of two groups of 12 yr olds not because they were noticeably inattentive, but in the belief that children's attention can change according to how a classroom is lit, and according to which type of whiteboard they read from – one that glows versus one that does not.
All children within the age groups tend to *vary* in their distractibility levels, though longer periods of concentration are often noticeable in older children who seem to exploit various strategies to buffer themselves from distraction. These strategies can differ from child to child and this was evident in the two classes I studied. Distractibility is useful to teachers if it reveals ways of engaging children, and in my case I noticed the following: after IWB use became compulsory for

teachers in my teaching centre from September 2003, my occasional use of a TWB produced initial expressions of dismay in my young learners – I wondered, therefore if the IWB's ability (or lack of) to sustain children's attention should become my main focus. It did.

## The learners

All my research subjects were finishing Primary school, and had attended the language centre for 9 months. Relative homogeneity was assumed from their shared L1 (Cantonese), the syllabus, their familiarity with communicative activities/routines and a male majority in both groups.

Heterogeneity was evident from their spoken/written English levels, reflecting a mix of Chinese-medium school-goers (receiving one hour of English per day), and English medium school-goers (learning subjects through English). Different starting points in their English learning was evident, from 9 years (for Hong Kong born EMI learners) to one year for some recently arrived Mainland Chinese learners who had since been attending CMI schools, and whose level was, interestingly, not far behind that of the others.

## The classroom research

Using a series of say-read-look-write activities, with two classes (to increase reliability), for a short period over a number of lessons, each one week apart, I alternated between an IWB one lesson, and a TWB the next. I thought it important to check what language the learners knew to begin with, and to see if short 'lexical chunks' elicited, read and memorised through the auditory and visual channels, were appropriate, and what would result from a memory test.

I therefore first collected baseline data with both classes (which I taught back to back) in a lesson on the theme of 'The Body'. Students drew around one student's body in each of four groups. Body parts were labelled (using cards) and fed back whole-class. Collocations describing emotional cues using non-verbal gestures which carry social meaning, (e.g. smacking the forehead when you forget something etc) were elicited and written on flashcards. Students listened, repeated, and then read them first chorally, then silently, from the cards stuck on the wall in descending order. The cards were removed and recall was tested by writing (in order of descent), the collocations on blank paper.

| |
|---|
| 1. Shrug your shoulders |
| 2. Nod your head |
| 3. Scratch your ankle |
| 4. Smack your forehead |
| 5. Rub your elbow |
| 6. Pat your stomach |
| 7. Blink your eyes |

I followed this up with two cycles of tests over a number of lessons. In each lesson I elicited more collocational multi-word units on the same theme (the body) but this time wrote 7 of them on the IWB with classroom lights off in one lesson and in the next, the following week, on the TWB, with all overhead (fluorescent) lights switched on.

Students listened, repeated, read aloud, read silently and wrote in the order they remembered having read the collocations, and I quantitatively analysed their responses.

The video recordings of behaviour of 5 students in each group while they read in each environment (both aloud and silently) allowed me to examine, and quantitatively analyse, their behaviour using what I considered to be a set of low inference descriptors of behaviour indicating attention level. I analysed the results according to medium (IWB or TWB), reading task (aloud or silent), group and gender. The descriptors counted instances of eye gaze direction (when divided) fidgeting, disruption of the task, asking teacher irrelevant questions, engagement in horseplay, and speaking to nearby students.
I triangulated evidence of the children's behaviour (while being tested), with the test results and data gathered from questionnaires and interviews with the students themselves on the subject of lighting in classrooms, particularly their views on the attention-sustaining (or not) capacity of the IWB

## Findings

Differences between the recall test results in both groups were minimal. However, gender differences according to task and medium in both groups were clearly apparent. The results, overall, suggested that the girls' attention was consistent in all tests, from the baseline to testing using both the IWB and the TWB.

| **Baseline** | **Girls** | **Boys** |
|---|---|---|
| **Flashcards & daylight** | **61%** | **23%** |
| **2 Cycles** | **Girls** | **Boys** |
| **IWB & lights OFF** | **63%** | **72%** |
| **TWB & lights ON** | **67%** | **49%** |
| **Total** | **65%** | **60%** |

Boys' recall, on the other hand, was low in the baseline test (which used daylight) but appeared to improve dramatically when recalling from the IWB with lights off, compared with their more mediocre recall after reading from the TWB with classroom lights on. The video evidence showed interesting patterns in the students' behaviour according to task. Both sexes appeared slightly calmer when reading *chorally* from both whiteboards although distraction was still apparent. Girls seemed minimally distracted when reading chorally, but this was mainly from the TWB, whereas boys seemed slightly more distracted, dividing their attention (albeit minimally), when reading chorally from both whiteboards.

*Silent* reading produced an altogether stronger pattern, particularly from the TWB, reading from which seemed to induce significantly more restlessness (double the amount of divided eye contact with the board, and spoken instances). Attention, overall, was low in both sexes, though the boys strayed off task, fidgeted, and divided eye-gaze slightly more than girls, and chatted! Silent reading from the IWB showed almost equal distraction in both sexes, and the boys appeared, again slightly more distracted than the girls.

Interviews and questionnaires revealed overall positive attitudes towards use of the IWB. What all learners liked about it was its visual impact, user-friendliness, its interest value and ludic value. Emotional, aesthetic and hygienic values, (hygiene is all-important in the post-SARS Hong Kong young learner psyche) although mentioned, seemed of less importance. They disliked technical problems, teacher-centredness and illegibility.

# Conclusion

What can we conclude, then? Perhaps two things. One, that learning styles and classroom behaviour differ according to gender, though the degree to which classroom lighting influences these styles and behaviours is uncertain (despite the dramatic differences in the boys' recall from one test to the next). Secondly that small-scale classroom research involving the use of technology should not be read in black and white, i.e. recalling accurately from a screen that glows in dim lighting is 'good'; fluorescent brightness, distraction and poor recall from an un-glowing screen is 'bad'. Teaching can be to blame for student inattentiveness as much as the child's developmental timetable, or classroom lighting. Children's inattention to what is being 'taught' (recall of order of 7 collocations) and how, (through rote learning) can be a case of teacher-skills-shortcoming, rather than the 'inattentive' learner's inability to recall with consistency. Furthermore, video analysis of behaviour, when using low-inference descriptors, might be better validated if rated by more than one observer. Fidgeting (e.g. pulling hair, scratching) might signify distraction for one observer, and concentration for another.

Boys did seem more attentive to the IWB in my study, however. From a teacher education perspective, this mini finding may inform our approach to fulfilling boys' particular need for help with task engagement – if use of an IWB in a dimly lit classroom works better to capture boys' interest, then we should exploit this. Careful consideration of when and how to do it, of the variables associated with children's attention to tasks, and acceptance that there is, as yet, un-firm evidence of the effects of lighting on the brain, may also be necessary.

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