

Interactive whiteboards: not so smart?

Purpose of Work:

An interactive whiteboard, or IWB, is a large interactive display that connects to a computer and projector. A projector projects the computer's desktop onto the board's surface, where users control the computer using a pen, finger or other device. The board is typically mounted to a wall or on a floor stand (wikipedia, 2009).

IWB's are enjoying increasing penetration into schools around the world (BECTA, 2008). In the United Kingdom, 98% of secondary and 100% of primary schools have at least one IWB. Data is harder to come by in the United States. Smart Technologies, the market leader in production of IWB's states they sold 267,000 IWB's in the United States in fiscal year 2008 (Smarttechnologies, 2008).

Considering the widespread use of IWB's, the cost (\$2400 USD per board and computer), it is reasonable to ask **if they make instruction better**. Many IWB's *replace* chalkboards and whiteboards, adding a sense of urgency. **Do IWB's enhance teaching and / or learning?** The question is complicated because measuring learning is tricky (should we use test scores, ipsative assessment, portfolio assessment), and teaching is an individual exercise - teachers frequently use different techniques and approaches.

Research Questions

1. Is classroom instruction using interactive whiteboards qualitatively better than instruction without interactive whiteboards?
2. What does peer-reviewed journals say about educational efficacy of interactive whiteboards?
3. What are "best practices" for interactive whiteboards?

Background

Hunter College Campus Schools is a school for gifted and talented children. The school is located in Manhattan, New York City. The school is comprised of two logical sections, the elementary school (HCES) and the high school (HCHS). The only point of entry into the school is kindergarten for the elementary school, and 7th grade for the high school. Both schools have highly selective, rigorous admission criteria. Over the last two years the parent associations at both schools have invested heavily in the purchase and installation of IWB. Every classroom in the HCES has an IWB and 80% of the high school classrooms have IWB's.

My role in the school is an instructional designer. I am responsible for staff development and instructional design around technology and learning. My goal in researching this paper is to look for best practices, and ferret out research-based, proven methodologies for IWB use. Thus far, my efforts have not been as successful as I would like. Teachers use IWB's minimally, with little use of advanced features. However, when I ask teachers if the IWB's are making a difference in their **teaching** the answer is an unqualified yes. When I ask if IWB is making a difference in **learning** the teachers seem not to know.

Review of the Literature

We are only concerned with **peer-reviewed, journaled research**. In summary: IWB's increase student engagement and interest. IWB's make **teaching** more efficient. There is no evidence IWB increase student outcomes, but there may be a "halo" effect from the increased motivation.

The research I reviewed was concerned with understanding if smartboards are effective, and if so, how. Higgins, Beauchamp, & Miller performed a meta-analysis and discussed the history of interactive whiteboards in research. They went on to prove there is a highly significant correlation between student motivation and interest and the use of an interactive whiteboard. Interestingly, they said there was no evidence interactive whiteboards made a difference in learning outcomes. Most research reinforced the idea of increased student motivation and interest when an IWB was used for teaching. Kennewell, Tanner, Jones and Beauchamp carefully explained that interactivity and social interaction is critical to learning. They said interactive whiteboards aren't very good for fostering interactivity, and technology in school is better for autonomous learning. The Kelley et. al. article mentions there isn't any direct evidence that links IWB's to learning outcomes (higher scores), but increased motivation and interest has a strong effect on outcomes. In other words, there is clear evidence that IWB's can make teaching better, but there isn't any evidence it makes learning better. Discussing the idea of multimedia and multi-sensory presentation by Smith, Higgins, Wall and Miller write

"It is not certain whether verbal and visual information are always best presented together, and if dynamic visuals are always better at promoting understanding

than static visuals. Recent research reveals that simply showing a process to a learner with the aid of dynamic visuals would not, "miraculously produce understanding of that process" (Goldman 2003, p. 240, quoted in text). (2005, p 97).

Beauchamp and Parkinson reinforce that IWB effectiveness is "anecdotal rather than research based (Beauchamp, 2005)". The same authors note that once the initial "wow" factor wears off, teachers must increase student engagement.

Considering the teacher-focus (not learning focus) in the available research, what are some things teachers can do to maximize the use of an IWB?

From the Kelley et. al. article, IWB's enable the act of **teaching** to:

- enable a smooth transition between activities within a lesson;
- facilitate a more efficient presentation and more professional delivery of multimedia resources;
- provide 'seamless flow' from one teaching point to the next;
- quicken the pace of lessons;
- reduce the time spent on 'a preoccupation with management of resources';
- allow 'lesson readiness'—lesson starts more or less straightaway;

Almost all the reviewed research seeks to explain what is different about teaching with an IWB as compared to "traditional" teaching. The chart below as seen in Beauchamp, 2005, et. al., is representative of unique teaching characteristics found when using an IWB.

Box 1 Interactive whiteboard software tools that provide teachers with opportunities to use distinctive teaching strategies	
<i>Ways of treating information</i> <i>Whiteboard features</i>	
Capturing	Copy and paste from other software, e.g. <i>Word</i> , graphics packages 'Photograph' screen images
Emphasising	Tickertape function (a word or phrase continuously moves across the screen) Large text Spotlight function (the view is restricted to a circular area of the screen)
Storing	Storing on flipchart pages to be revisited later on in the lesson or in subsequent lessons Recording as flipchart files Storing in the link library
Annotating and modifying	Using the pen, sometimes in conjunction with other features such as arrows or lines, to add writing to existing images and text Using the highlighter pen Carrying out DART activities such as: – using drop and drag to match labels to features – rearranging objects or text into a correct sequence – cloze procedure exercises (a coloured pen is used to cover text and the whiteboard 'rubber' is used to reveal the hidden text)
Linking	Linking to other pages in the flipchart Linking to files stored on the computer, e.g. <i>Word</i> , <i>PowerPoint</i> , <i>Excel</i> Linking to programs stored on the computer, e.g. <i>Crocodile Clips</i> , concept cartoons, concept mapping software, <i>KarZouche</i> Linking to Internet sites

This chart, and others like it in the research I reviewed, don't discuss how IWB's qualitatively make learning better. But they do discuss what they **think** teachers should do to with an IWB to make learning effective.

Smith, Higgins, Wall and Miller write:

Moreover, the facility of IWB's to present information in sharp colours, and to annotate, conceal, manipulate, move and zoom in on or focus on images, including text, is said to enhance the learning process...(2005).

A last interest was a brief study in gender role and IWB's. I included this study as a matter of practical interest; do boys and girls interact the same way when an IWB is in the room? Smith, Hardman and Higgins mention in primary school-age children, boys tend to dominate class discussion when an IWB is present in the classroom.

Proposal for the Hunter College Campus Schools

Description of Program

Our review of the research has demonstrated there is no evidence of increased learning outcomes when using an IWB. Our review of the research has also demonstrated IWB's highly increase enthusiasm and motivation (which may account for increased learning outcomes). However, in a **school for gifted kids** - who are already motivated and enthused - IWB's may not be the best choice. IWB's can make teaching more organized and efficient, and given the context at Hunter College Campus Schools, this seems the appropriate path to pursue.

The program will focus on helping teachers to make the best use of their classroom time, organize and share their lessons using IWB's. The program will teach the following skills:

1. **Saving** classroom notes
2. **Sharing** classroom notes via distance learning tools
3. **Linking** presentation to other media
4. **Annotating** different media (videos, webpages, etc) using different software tools
5. Using an IWB to foster **Interactivity** in the classroom.
6. **Teaching students** how to use the IWB to create effective assessment of their learning
7. **Identifying, training, and supporting** teacher-leaders within the building.

Learning will be through workshops, luncheon groups, youtube videos, a web-based "learning center" and the creation of learning communities within the school. Special focus will be for teachers to "make a lesson" using an IWB.

Summary of Recommendations

1. Develop a curriculum for training users in the operation of an IWB and smartboard software, "smart notebook software".
2. Develop and present a list of research-based best practices for using an IWB,
3. Implement a luncheon series of teacher-led "best practices" so teachers can share what works.
4. Focus training on saving time and "making the most of your time"

Teachers like to save time and value efficiency. The goal of the program is to help them save time, organize themselves, and be more efficient. IWB's come with many tools to save, export, organize, categorize, and link to other resources.

Funding

The school is lucky to have an instructional designer. My job is to help faculty to use technology. This plan is part of what I do in a normal work day. The only cost associated with this plan is \$1000 for a "train the trainer" course for the notebook software.

Evaluation

Attendance at voluntary professional development sessions is an excellent indicator for interest in a session. Pre and post surveys are the best way to quantify learning.

Surveys will be used to understand how the program is effective. However, time is a precious thing in a teachers' day. When a teacher voluntarily chooses to attend a professional development, it is because:

1. there is free food and / or
2. the teacher perceives genuine value in the training

Teachers talk to each other. In fact, best practices often travel through peer communication. This is one of the primary ideas behind learning communities. As an instructional designer, I **rely** on peer communication as a method of passing information through an educational institution. Experienced teachers are largely jaded to "the next professional development initiative" to come roaring through the school district. So although it may seem like a crude indicator, attendance at voluntary training is an excellent way to evaluate effectiveness. We especially look for what game developers call **churn**, or old users leaving and new teachers coming. An influx of new faces is the one way to know if your training is effective.

Another way is to look in classrooms. What are teachers **actually doing**? It is very important to see what teachers are actually using in their classrooms. One of the most

important things to support technology is to make sure a trained person is available to help teachers **in the classroom**.

A Final Note

That IWB's have been widely deployed in schools before understanding their effectiveness is gospel in many public schools. It is standard practice in public US education for the "cart to lead the horse". This should not be seen a pejorative thing, but as an opportunity to look for the best solution to effectively educating our children.

References

Beauchamp, G., Parkinson, J., (2005). Beyond the 'wow' factor: developing interactivity with the interactive whiteboard. *School Science Review*, 86(316) 97-103.

Gillen, J., Kleine Staarman, J., Littleton, K., Mercer, N., Twiner, A., (2006). A "Learning Revolution"? Investigating pedagogic practices around interactive whiteboards in British Primary Classrooms. Paper presented at the AERA Conference, 2006.

Higgins, S., Beauchamp, G., & Miller, D. (2007). Reviewing the literature on interactive whiteboards. *Learning, Media and Technology*, 32(3), 213-225, doi: 10.1080/17439880701511040.

Interactive whiteboard. (2009, May 6). In Wikipedia, The Free Encyclopedia. Retrieved 15:46, May 14, 2009, from http://en.wikipedia.org/w/index.php?title=Interactive_whiteboard&oldid=288348156

Kelley, P., Underwood, G., Potter, F., Hunter, J., Beveridge, S., (2007). Viewpoints. *Learning, Media and Technology*, 32, 333-347, doi: 10.1080/174398807015111164

Kennewell, S., Tanner, H., Jones, S., & Beauchamp, G. (2007). Analysing the use of interactive technology. *Journal of Computer Assisted Learning*, 24, 61-73, doi: 10.1111/j.1365-2729.2007.00244.x.

Kitchen, S., Finch, S., Sinclair, R. (2008). British Educational Communications and Technology Agency (BECTA). 2008. *Harnessing technology schools survey 2007*. National Centre for Social Research, United Kingdom. Retrieved from http://partners.becta.org.uk/upload-dir/downloads/page_documents/research/harnessing_technology_schools_survey07.pdf

Smart Technologies. (April 13 2009). *SMART Supports U.S. government plan to invest in education*. [Press release]. Calgary, Alberta: Smart Technologies.

References

Smith, F., Hardman, F., Higgins, S. (2007). Gender inequality in the primary classroom: will interactive whiteboards help? *Gender and Education*, 19(4), 455-469, doi: 10.1080/09540250701442658

Smith, H., Higgins, S., Wall, K., Miller, J. (2005). Interactive Whiteboards: boon or bandwagon? A critical review of the literature. *Journal of Computer Assisted Learning*, 21, 91-101.