A LITERATURE REVIEW

“Are Interactive Whiteboards Interactive?”

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WORD COUNT 2109

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**Background: FROM OHP to IWB**

 Ever since I first used an Interactive Whiteboard (IWB), a Smartboard, in 2005 I have been amazed by the educational and technological potential I had at my disposal, goodbye OHP! I observed the impact that it had on my students’ engagement and motivation while they interacted with it individually, in groups, and as a class; and I noted the particular interest shown by the English Language Learners and Special Needs students. The classroom was buzzing. Using a task board, I almost always had a group or individual working on the Smartboard. I became convinced that this was an exceptional tool to promote integration of ICT but more importantly to support quality learning. I am still convinced.

So what is an IWB? An interactive whiteboard is a technological tool that enables users to display and manipulate computer images and text through a digital projector. All of the activities can be saved, printed and shared with students and users can interact with the board directly user their finger or a special pen as a mouse (Somyurek, Atasoy and Ozdemir. 2009. p.369). Beauchamp (2010, p.760) discusses how IWBs can be used as an object of interaction, a participant of interaction or as a tool for interaction and this interactivity can be characterized as technical (integration with the technological facilities of the board), physical (manipulation of IWB elements) or conceptual (interacting and constructing curriculum concepts on the IWB). Ultimately, it is how the IWB is used by teachers and students that will determine how interactive it will be in a classroom setting.

**Introduction: An Interactive Inquisition**

The digital age is upon us. As educators we must be 21st century learners ourselves and the digital tools available at our fingertips are growing as we speak. For over a decade, schools around the world have been embracing the promises made about the technological affordances of the IWB and school districts have been buying up large- this is some seriously expensive ‘chalk’ we are investing in! However, this proliferation is occurring despite a lack of evidence to support that the IWB is a positive technological tool. Are IWBs worth the investment? Has anyone looked at the cost-benefit relationship?

This article examines qualitative and quantitative research that has been conducted within the last five years in primary and secondary schools to answer the following:

1. Do Interactive Whiteboards equate to interactivity?
2. What are the barriers to the effective use of IWBs in classrooms?

**Summary: IWB Research**

The articles that have been reviewed had different scopes and methodologies but each scrutinizes the effectiveness of the IWB as a teaching and learning tool in some way. Beauchamp and Kennewell (2010) developed a very interesting interactivity scale to measure the quality of the interaction with the IWB which categorizes interaction into five categories: none (watching and reading IWB), authoritative (teacher directed recall questions), dialectic (teacher directed probing questions), dialogic (developing knowledge and testing ideas by students) and synergistic (critical thinking and problem solving involving reflection and analysis) (p.762). This is a highly valuable tool to help evaluate if IWBs are being used as interactive learning tools in classrooms. This study also discusses how the IWB can increase student engagement but that this is often superficial and is directly related to the quality of the teacher’s pedagogical knowledge of the technology and the expert orchestration of digital resources.

**Quality Teachers = Quality IWB Integration**

Gregory (2009) conducts a comprehensive phenomenological study using detailed interviews and observations of three highly experienced and qualified primary teachers to determine what impact the experience of having an IWB in the classroom has on the teaching and learning environment. Some of his analysis is highly subjective yet depicts a clear picture: the IWB promotes student-teacher interaction, enhances automaticity, increases teachable moments, creates a sense of community and provides opportunities for collaboration when teachers take the time to plan appropriate and engaging lessons. The participants in his study were keen to learn and use the IWB and are rapidly acclimating to the technological world so he also highlights that there is an inherent danger to promoting the use of IWBs: expecting the learning to serve the technology.

**Lack of Training = Poor Integration of IWBs**

In Turkey, in 2009, Somyurek et al. conducted an evaluative case study in which they surveyed 270 teachers to determine what problems are emerging to hinder effective integration of the IWB. Unfortunately, their response rate was only 28%, but through triangulation of their data they yielded some interesting results. The trend of purchasing IWBs in Turkey without consistent investment in in-service training, digital materials and equipment support/maintenance is inhibiting effective use. In fact, 65% of the teachers surveyed had never used an IWB and this is attributed to the teacher’s lack of technological and pedagogical skills (p.370). If these issues are not addressed, schools will have underutilized equipment. Education is not a uni-directional process and organization is required to achieve success. The teachers surveyed acknowledge the potential for the IWB to be a powerful technological aide to support student-centred learning but don’t know how to maximize this.

**Groups Using IWBs**

Warwick, Mercer, Kershner and Starrmann (2010) embarked on an intriguing case study of twelve science teachers to determine how pupils use the IWB when working together on science activities. Each teacher prepared and taught three lessons that had at least one group working semi-autonomously at the IWB and the vicarious presence of the teachers was strikingly obvious. The classroom observations demonstrated that these teachers were able to use the IWB as more than just a “teacher resource box” and that the teachers were effectively developing “their commitment to self-regulated and collaborative learning” (Warwick et al. 2010. p.351). By using the IWB in an interactive and collaborative manner, and having established clear expectations for group and pair discussions, the teachers were able to facilitate their lessons vicariously. The research team therefore deduced that the IWB can be both a tool and an environment that promotes creation of a shared dialogic space where co-constructed knowledge building can take place provided that the teacher provides appropriate support.

**IWB = Increased Motivation in maths?**

Quashie (qualitative study in 2009) and Torff (quantitative study in 2009) each investigated the effect of the IWB on student motivation in Maths. Each of these studies indicated that the IWB does increase student engagement and motivation but only marginally. The Torff study is exceptionally vague about both how the IWB was used and in their data analysis. Quashie discusses how most of the ‘interaction’ with the IWB seems to be between the teacher and the IWB and although the students interviewed indicated that they felt more involved, interested and participated more frequently, they were rarely observed actually using the IWB as a tool or an environment. So is the IWB simply a glorified textbook and blackboard? Lopez (2010) looked at whether the IWB could improve the academic success of English Language Learners (ELL) in reading and mathematics using a quasi-experimental study. Lopez collated baseline data to compare the ELL students to the non-ELL students in traditional and digital learning classrooms and the results were clear. The IWB does improve academic success for ELL students in reading and mathematics in grades three and five thereby bridging the gap with the mainstream students and achieving performance parity.

**Synthesis: Underlying Themes in the IWB Research**

The various articles reviewed are diverse in their approach. Each research paper aims to prove the stated hypothesis by employing a structured methodology and utilizing a literature review in the process of reaching conclusions. Although they are independent studies using varied methodologies with different goals, interesting parallels are evident.

**The Case Studies**

The three case studies that were reviewed carried out by Somyurek et al. (2009), Warwick et al. (2010) and Torff and Tirotta (2009) were very different in nature and scope. Somyurek et al. did an evaluative case study to investigate the suitability of investing in IWB in Turkish schools and had a poor response issue. Although they triangulated their data: online questionnaires, student and teacher interviews and a literature review, their study is weak due to the exceptionally low response rate (28% of teachers and <10% of students) which watered down their conclusions (p.370). However, the study did reveal that the greatest concern is the lack of in-service training for IWB use, with the students even commenting on lack of teacher skill in interviews. The Warwick et al. case study, on the other hand, was funded by the ESRC and looked at twelve different teachers and how they used IWBs to facilitate autonomous group work. The study involved observations of three lessons per teacher and the data was analysed using socio-cultural discourse analysis. Their study is a case study because each teacher took a different approach to the use of the perceived affordances of the IWB. The main limitation to their study is that they are evaluating two phenomena: the IWB and the teacher’s vicarious presence. In trying to determine the latter, the IWB component of the study was not a focus and one or the other should have been the goal of this research. The quantitative study conducted by Torff and Tirotta in 2009 involved 773 students in grades three to five and 32 teachers (19 IWB users) each completing a survey. The participants in this study had unlimited access to IWBs but individually opted to use the IWBs (or not). It was interesting to note that none of the questions for the students even mentioned the IWB and the teacher questions were all structured items, preventing freedom of response. Furthermore, the self-reported motivation with the use of IWB in maths is higher than without IWBs but not significantly.

**The Qualitative Studies**

The qualitative studies carried out by Gregory (2009) and Quashie (2009) utilized interviews and observations of teachers and students using IWBs in their classrooms. There are some overt limitations in each study which unfortunately, devalue their results. Gregory’s phenomenological or *human science research* and use of purposive sampling prevents a broad perspective of the possible outcomes. He has deliberately set himself up for a positive outcome: the results of the study indicate the IWB promotes teacher-student interactions, increases automaticity and teachable moments and enhances collaboration. Although Quashie defines four types of interaction before she conducts her observations {Type 1: Students have opportunities to discuss their thoughts with each other and the teacher, Type 2: students are able to manipulate/change visuals on the IWB, Type 3: Students are able to manipulate/change visuals on the IWB by giving directions to the teacher and Type 4: Students are able to voice their opinions (Quashie. 2009. p.3)} she observes two of the four teachers only once and interviews only four students to reach her conclusions.

**The Quasi-Experimental Research**

Lopez (2010) and his interesting quasi-experimental research (the Digital learning Classroom project) informs us that IWBs do positively influence the academic success of ELLs in maths and reading. The project endeavoured to link IWB activities to prior knowledge, involve collaboration, teach in a variety of contexts, promote high order thinking skills and to provide feedback, which is commendable, and used a baseline test to measure progress. However, he also indicates that the results of this study do not describe how the IWB is being used to achieve these positive results. This is a common theme in all of the IWB research: there is a consistent lack of detail on how to use the IWBs interactively and effectively.

**Conclusions: Building Bridges**

In conclusion, the research on the effectiveness of IWBs continues to be ineffectual. The evidence from the studies supports that IWBs do increase interactivity, just. It also purports that the IWB has the ability to promote student motivation and academic achievement explaining that this is not happening uniformly due to:

* lack of in-service training: lack of technical competency on how to use the IWB lack of pedagogical competency on how to integrate them into classroom activities
* lack of a school plan on the use of IWBs (and other administrative concerns)
* lack of digital educational resources
* lack of support and maintenance (Somyurek et al. 2009).

Therefore, educational administrators must take action to remedy these problems before the IWB phenomenon leaves a bad taste in the collective mouth of the taxpayers.

Future research needs to evaluate how IWBs are being used and how to promote the use of them interactively in the classroom. Further studies on specific IWB software and hardware would also be valuable. Perhaps the SECTIONS model by Bates and Poole (2003) should be applied before schools invest significant monies into IWBs to ensure that IWBs are the right technology for a particular school at a particular time. Ultimately, if IWBs continue to be used as glorified data projectors, the utility of educational ICT budgets is being squandered.

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