A RESEARCH PROPOSAL

"Are Interactive Whiteboards Interactive?"

Diana Wilkes

ETEC 500, Research Methodology in Education, Section 66C, UBC

WORD COUNT 2093

Student Number: 18562090 Dr. Clifford Falk Aug 12, 2010

Definition: What is an interactive whiteboard (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 using their finger or a special pen as a mouse (Somyurek, Atasoy and Ozdemir, 2009, p.369).

Introduction- Are IWBs being used interactively?

Let's begin by stating what should be obvious: interactive whiteboards (IWBs) don't engage students, teachers do. Technology is a vehicle that educators can utilize to improve student learning. Technology can generate interest, increase motivation, reinforce concepts, offer individualized learning opportunities and ultimately foster the creation of an engaging, non-threatening learning environment. We cannot use technology to replace our teachers: and it certainly cannot replace the significance of the teacher-student relationship; what it can do, if used appropriately, is make a competent teacher even better and consequently, more productive. IWBs are high cost technology (expensive chalk!) and the research is mixed about whether they increase participation and motivation; however, this can be largely attributed to how the IWBs are being used. Do teachers use them as glorified projectors or are they able to utilize them as a tool that can promote active learning? Since we know that students don't learn by watching the teacher, that they learn by collaborating and doing authentic learning activities, it means that the pedagogical skills of the teacher in planning the use of this tool are paramount to its success. Meaning, that if the IWB is implemented with fidelity, student engagement/interaction will increase and this will subsequently translate into improved academic achievement. If educators are not able to do this, the IWB is purely a novelty to be perceived as an oxymoron. This study will endeavour to determine if the IWBs are actually being used interactively by teachers and students.

Literature Review- What does the research say?

Beauchamp and Kennewell (2010) developed a usable interactivity scale to measure the eminence of the interaction with the IWB. It has five categories: none, authoritative, dialectic, dialogic and synergistic (p.762). This is an essential tool which has been adapted for this study. The new matrix (as seen in Appendix C-1) will enable the researcher to evaluate the degree of interactivity with the IWB in each lesson. Beauchamp and Kennewell also discuss the ostentation of engagement engendered by the IWB and assert that this is correlated to the quality of the teacher's didactic familiarity with the technology and their ability to exploit the digital resources successfully.

In a phenomenological study, Gregory (2009) concludes that the IWB supports student-teacher communication, augments automaticity, boosts the teachable moment, crafts a sense of community and promotes collaboration. Yet he cautions that there is an inherent risk to promoting the use of IWBs: expecting the learning to serve the technology. Additionally, a case study of twelve science teachers by Warwick, Mercer, Kershner and Starrmann (2010) demonstrated through observations that the teachers could use the IWB effectively to engage students in collaborative learning and no longer relied on the IWB as a resource for disseminating information. What is unique in this study is that the teachers were able to facilitate their lessons vicariously since they had already established clear expectations for group and pair discussions. A palpable observation was that the IWB could be both the instrument and the environment in which shared dialogue leads to constructivism. Two further studies by Torff and Tirotta (2009) and Quashie (2009) concluded that although the interaction with the IWB appears to be predominantly between the teacher and the board, the self-reported motivation for students using the IWB in maths is elevated, but not drastically so. Lopez (2010) embarked on the Digital Learning Classroom project and concluded that IWBs have a constructive influence on the scholastic achievement of ELLs in

maths and reading but the study fails to elaborate on how the teachers are achieving this target. This is a common trend in IWB research: so few studies actually identify *how* the IWB is being used by the teachers and students. Perhaps this is why studies like Somyurek et al. (2009) elicit that the biggest deterrent to effective use of IWBs is the lack of professional development: teachers have the tool but are not informed on how to use it successfully.

In summary, research on IWBs fails to deliver concrete evidence to its efficacy. Although the research indicates that the IWB has the potential to motivate and engage learners, it is not concrete. Barriers to effective IWB use are linked to inadequate training, lack of administrative vision, minimal access to digital resources and derisory technical support (Somyurek et al. 2009). Furthermore, if IWBs are used only as glorified data projectors their educational potential is simply idle, and their ability to be interactive is dubious. The users of this technology need to be empowered to fully utilize the IWB as a functional, interactive educational tool.

Statement of Problem

Using the SECTIONS model developed by Bates and Poole (2003), the IWB as a technological classroom tool has been briefly critiqued in Table 1 below. Bates and Poole (2003) suggest that students need to learn new technology only when it serves an educational purpose. The IWB certainly does this when it is used to its full potential. The main issue for schools will always be the initial cost and deciding if it is worth the investment. For all that the IWB can afford teaching and learning I believe it is worth it provided adequate and on-going training is provided for the teachers who use the IWB.

However, I believe that in most cases the IWB is not being used interactively with students. I think that if teachers are given some pedagogical training that provides them with

Applying the SECTIONS Model to the IWB (model from Bates and Poole, "A Framework for Selecting and Using Technology. In Effective Teaching with Technology in Higher Education: Foundations for Success." 2003)	
Students	The technology is suitable for all students based on their initial skills The technology is suitable for students of all backgrounds (culture, age, level) The technology can be used by individuals, groups or entire classes Can be used to cater to a variety of learning needs with scaffolding put into place
Ease of use	The technology has a user-friendly interface and the board itself can be installed at a suitable height (ie. Lower for primary students) The interface has an extensive range of tools for assisting ESOL students, has excellent scaffolding opportunities and it enables a variety of learning activities to meet the learning needs of students Intuitively easy for students and teachers to use in all areas Software includes tutorials in depth and some online support Simple training enables any user to use it but more in depth training is required for complete pedagogical use
Cost	An expensive piece of equipment (~$1000-6500 CND) means a significant initial investment is required. Most boards come with initial training packages. Additionally, if further software is desired this will compound the cost. Also, there will be some cost associated with replacement bulbs and maintenance/support.
Teaching and Learning	Bates and Poole (2003) instruct us to examine three aspects. They are "epistemology, the content and the skills to be developed by the learner, and methods of student assessment" (p. 96). The IWB has a myriad of functions to support learning in groups especially- tutorials, brainstorming, virtual labs, audio conferencing, interviews, digital story/multi-media creations, editing text etc. The flipcharts can be saved for assessment of viewed by groups of students for peer assessment.
Interactivity	Students can use the technology individually or in groups easily Includes a high quality and variety of communication tools meeting diverse learning styles; consistently supports higher level thinking; and has frequent opportunity for knowledge building
Organization	Deciding where the boards will be located is important to maximize use PD plan needs to be put into place to ensure in-service training is ongoing Need a school-based IWB expert (perhaps one person receives training and them trains the rest of the staff)
Novelty	An essential tool to provide opportunities for simulation and interactive group work, only a novelty if treated as one, technology with longevity
Speed	Initial training is required before use so can be used immediately after that, upgrades come up every year so these will need to be assessed

Table 1: applying the SECTIONS Model to the IWB

engaging and interactive strategies for using the IWB there will be increased interactivity. My belief that when the IWB is used interactively, and consistently, enhanced student learning transpires, originated with my own personal classroom experiences while using an IWB with a mixed ability year seven class. This study aims to demonstrate that proper,

authentic training will lead to highly interactive use of the IWB with groups, individuals and even the whole class. Therefore, my focus questions are:

1) Do teachers use the IWB in an interactive manner with individuals, groups and/or the whole class in science?
2) Does focused training increase the interactive use of the IWB in science?

Methodology

Participants: The study will involve ten female primary science teachers and their respective grade five classes from public schools who are participating in the Abu Dhabi Education Council's educational reform project in the United Arab Emirates.

Materials: Each of the teachers has unrestricted access to a Promethean IWB and its associated software. Teachers will also have access to at least two computers in the classroom and a fully equipped science laboratory. All are novice users who have used the IWB for two years or less.

Procedure: This study will be using a triangulation mixed methods research design encompassing a quasi-experimental approach that employs teacher-student surveys, interviews and observations. The data collection involves the following three phases:

Phase 1-Baseline Data and Initial Observations
• To begin, the teachers (Appendix A) and their students (Appendix B) will complete a survey about IWB use in their science classes. These will be distributed in person by the researcher and collected after 20 minutes. • Next, each teacher will be observed three times (using Appendix C1 and Appendix C2) and random students will be interviewed using Appendix D to determine their perspective on the influence of the IWB. • After this initial phase of the study, a personal interview with each of the participant teachers will be conducted using Appendix E.
Phase 2- Training and Final Observations
• Each of the ten teachers will receive one training session that will teach them how to use the IWB mechanically and a subsequent session that will provide them with a range of pedagogical strategies for using the IWB in science with individuals and groups. This will ensure that each teacher has some initial professional development and standard training in IWB skills. • Next, three observations of IWB science lessons for each participant teacher will be conducted using both a quantitative matrix as the interpretive technique combined with time-based and anecdotal observations (Appendix C). • After which, random students will be selected to answer some questions about the IWB lesson to gauge student voice regarding the IWB (Appendix D).
Phase 3- Reflection
• Finally, the teachers (Appendix A) and their students (Appendix B) will complete the attitudinal survey about IWB use in their science class again for comparison purposes. These will be distributed in person by the researcher and collected after 20 minutes.

Analysis: The analysis of the data gathered with each instrument will be different due to the perceived dichotomy yielded from positivist and interpretivist influences in the mixed methods approach. With the teacher and student surveys the data will be collated and statistics calculated for each response to give an overall picture of the attitudes that teachers and students have towards IWBs as well as how frequently and how interactively they are being used (before and after the training). The six observations per teacher will be recorded on the interactivity matrix and the time-based data sheet found in Appendix C-1 and Appendix C-2 respectively. The matrix was designed such that it will garner a clear picture of how the IWB is being used before and after the training. Again some basic statistics will

be calculated to show percentages by teacher and by category. Phenomenological analysis will be employed to identify trends in the teacher and student interviews (Appendix D and E).

Timeline

This study will be conducted over a period of 14 weeks as seen in the breakdown of Table 2: Timeline for Research below.

Phase		Tentative Dates
Initial tasks	• Select participants/schools • obtain consent from principals/teachers/parents • select venue for training • ensure unrestricted access to IWB exists and that there is onsite technician for support at each school	August 25-31, 2010
Phase 1- Baseline Data and Initial Observations	• Teacher survey • Student survey • 3 initial observations	September 1-30, 2010
Phase 2- Training and Final Observations	• Technical PD • Pedagogical PD • 3 Observations of each teacher • Random student interviews for Student Voice	October 1-31, 2010
Phase 3- Reflection	• Teacher survey • Student survey	November 1-7, 2010
Analysis and interpretation	• Collate survey results for before and after picture (teacher and student) • Phenomenological analysis of interviews • Collation of comments from students and analysis for trends (before and after)	November 8-31, 2010
Final Report	• Write final report including graphical organizers, conclusions and recommended next steps/future research	December 1, 2010

Table 2: Timeline for Research

Justification

The mixed methods approach to this study is justified pragmatically by the availability of resources. Conducting a large-scale quantitative experiment is simply not feasible at this given time with this limited population/demographic. Random sampling is also not feasible given the low number of female primary schools participating in the reform project in Abu Dhabi. The mixed methods design selected enables corroboration of data

which increases the validity of using only quantitative tools or just qualitative instruments alone- it overcomes the limitations of using only one method. The qualitative data elaborates and supports that which is collected via the quantitative instruments and the combination of the two data collection techniques complement each other. This study will offer evidence to inform judgements but does not guarantee veracity. The quantitative results enable scrutiny of the scope of the qualitative results.

Significance

This study will assist school districts in deciding if the IWB is a worthwhile technological investment. If the teachers do change the way they use the IWB positively after the training, this will also highlight the need for further continuous professional development and training on the effective and interactive use of the IWB. This research will tell us if the IWBs are being used interactively and if this use is perceived positively by students and teachers. Because the IWB is hugely expensive, it is wise to be sure that the educational and technological affordances match the goals of each individual school- this research and the SECTIONS evaluation in Table 1 will support schools in constructing this very important decision. Furthermore, this research will attempt to demonstrate that quality training = proper pedagogical planning and use of IWB = interactive and inspired student learning.

Interactive Whiteboard TEACHER Survey

This is a survey is part of a study on IWBs. Your participation will help us decide how IWBs can be used effectively for teaching and learning. This should take less than 10 minutes. Your answers will be confidential.

Please complete the following general information questions.

Gender: Male☐ Female☐	School:
Grade:	Teacher's name:

Please answer the following questions honestly by placing a tick √ under your choice.

	Every lesson	Most lessons	Some lessons	Hardly ever	Never
1. During an average week, **how often** are the IWBs used in your class?					

	Yes	If yes, could you provide examples?	No
2. Do you plan IWB activities for groups working **with** the teacher?			
3. Do you plan IWB activities for groups working **without** the teacher?			
4. Do you plan IWB activities for individuals working **with** the teacher?			
5. Do you you plan IWB activities for individuals working **without** the teacher?			

Please select the most appropriate response by placing a tick √ under your choice.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
6. I think students learn more when **I** use the IWB to teach.					
7. I think students learn more when **they** use the IWB to do an activity.					
8. IWBs make learning more interesting.					
9. I think IWBs make my drawings, diagrams and writing easier to see.					
10. When I use the IWB I teach the same way.					
11. I prefer preparing/delivering lessons that use IWBs.					
12. I allow the students use the IWB.					
13. I think IWB lesson are more organized					
14. I think IWB lesson are more interactive.					
15. I only use the IWB for whole-class activities.					
16. I have received training on how to use the IWB.					
17. I am comfortable developing digital resources for the IWB.					
18. I am comfortable planning activities for students to do independently/in groups on the IWB without my direct supervision.					
19. I think the IWB motivates my students to participate.					
20. What barriers/challenges have you had with regards to your use of the IWB?					

Appendix A: Teacher Participant Survey

Interactive Whiteboard STUDENT Survey

This is a survey is part of a study on IWBs. Your participation will help us decide how IWBs can be used effectively for teaching and learning. This should take less than 10 minutes. Your answers will be confidential.

Please complete the following general information questions.

Gender: Male☐ Female☐	School:
Grade:	Teacher's name:

Please answer the following questions honestly by placing a tick √ under your choice.

1. During an average week, **how often** are the IWBs used in your class?	Every lesson	Most lessons	Some lessons	Hardly ever	Never
2. Do you or your classmates ever use the IWB in groups **with** the teacher?	Yes	No	Could you explain **how** you use the IWB?		
3. Do you or your classmates ever use the IWB in groups **without** the teacher?	Yes	No			
4. Do you or your classmates ever use the IWB individually **with** the teacher??	Yes	No			
5. Do you or your classmates ever use the IWB in groups **without** the teacher?	Yes	No			

Please select the most appropriate response by placing a tick √ under your choice.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
6. I think I learn more when my teacher uses the IWB to teach.					
7. I think I learn more when I use the IWB to do an activity.					
8. IWBs make learning more interesting.					
9. I think IWBs make teachers drawings, diagrams and writing easier to see.					
10. My teacher teaches the same way with or without the IWB.					
11. I prefer lessons that use the IWB.					
12. My teacher lets the students use the IWB.					
13. I think the IWB make my teachers lessons more organized.					
14. I think the IWB makes my teachers lessons more interactive.					
15. My teachers prepares activities for individuals to do on the IWB.					
16. My teacher prepares activities for groups to do on the IWB.					
17. My teacher only uses the IWB for whole class activities.					
18. My teacher is the only person who touches the IWB.					
19. My teacher knows how to use the IWB properly.					
20. Our IWB often breaks.					

IWB Interactivity Matrix	***None***	***Authoritative***	***Dialogic***	***Synergistic***
Teacher	Lecturing / demonstrating	Teacher directed recall questions	Teacher directed probing questions and focusing of dialogue/discussion	Reciprocal questioning and critical response
Groups	Watching / listening/ copying	Disputational Talk	Challenging- cumulative to exploratory talk	Exploratory and contributory talk
Individuals	Watching	Doing, using	Constructing, finding, creating, exploring	Exploiting, innovating
ICT	Linear text, fixed graphics	Looking at and recall response to fixed resources	Constructing and developing product, involving information seeking, selection and elaboration of resources and hypothesis testing	Open problem solving, using critical thinking, creating product involving identification of context, analysis and reflection

Appendix C-1: IWB Interactivity Matrix (adapted from Beauchamp and Kennewell *"Interactivity in the classroom and its impact on learning"* 2010)

Interactivity at the IWB			
Time:	***Grade:***	***Subject:***	***Teacher:***
1. How many minutes did the **teacher** use the IWB in this lesson?			minutes
○ How did the teacher use the IWB?			
2. How many minutes were **groups** using the IWB in this lesson?			minutes
○ How did the group use the IWB?			
3. How many minutes were **individuals** using the IWB in this lesson?			minutes
○ How did the individual use the IWB?			

Appendix C-2: Interactivity at the IWB Observation Sheet

Interactive Whiteboard STUDENT Interview **This is interview is part of a study on IWBs. Your participation will help us decide how IWBs can be used effectively for teaching and learning. This should take less than 20 minutes. Your answers will be kept confidential.**	
1. Did you enjoy this lesson? Why? What about it was enjoyable?	
2. What did you learn to do in this lesson?	
3. How do you think the IWB impacted on your learning today?	
4. Did using the IWB help you learn in science today? How?	
5. Do you think your teacher uses the IWB effectively? Explain.	

Appendix D: Student Voice Interview Questions

Interactive Whiteboard TEACHER Interview **This is interview is part of a study on IWBs. Your participation will help us decide how IWBs can be used effectively for teaching and learning. This should take less than 20 minutes. Your answers will be kept confidential.**	
1. Have you received any in-service training on the IWB? Describe.	
2. Do you think you need more pedagogical or technological training to maximize the IWB potential in your class? Explain.	
3. How do you think the IWB impacts your students learning?	
4. How does having an IWB impact your lesson planning?	
5. Do you think you use the IWB effectively? Explain.	
6. What can you use the IWB for?	
7. Do you feel supported in your use of the IWB? Explain.	
8. Do you think the IWB is an interactive teaching and learning tool? Explain.	

Appendix E: Teacher Participant Interview Questionnaire

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