



# Using New Technologies in Intermediate Classrooms

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# Research Focus #1

*use of interactive whiteboard technology (IWB) in intermediate mathematics classrooms*





## Research Focus #2

*use of handheld computing devices (iPod Touch) in various subject areas at the secondary level*





# Using New Technologies in Intermediate Classrooms Project Report

- Review of recent literature
- Outline of our research process
- Observations
- Recommendations
- Areas for continued research

# “Old News” & “New Ideas”





# Using New Technologies in Intermediate Classrooms Project Report

- Review of recent literature
  - a) Interactive whiteboard research
  - b) iPod Touch research



investment in IWBs in Canada, UK & US has greatly increased since 2000

relatively little research into pedagogical benefits exists

early research struggled to find evidence of benefits of IWB use on student learning & achievement



# Recent Findings

- teachers require PD opportunities & time to share techniques with other teachers in order to use IWBs as more than a presentation tool
- significant changes in pedagogical practice develop after about two years with an IWB in classroom
- importance of letting students (not just teachers) have access to the IWB
- research now focused on finding evidence of specific features of IWB use that may lead to enhanced learning & student achievement



# Features of IWB Use that Support Learning

(Mercer et al. 2010)



# Research on iPod Touch Use in Classrooms



- iPod (2001) primarily music playing device, not widely used in classrooms
- iPod Touch (2006), handheld computing device, beginning to be used in classrooms, not nearly as prevalent as IWB use
- lots of research on other handheld devices (i.e. graphing calculators)
- little research to date on the pedagogical potential of iPod Touch

# Research on iPod Touch Use in Classrooms



- two-year study of iPod Touch use in Gr. 6, 7, 8 & 12 classrooms in a large urban board in Calgary (Crichton et al, 2011)
- sustained use observed in Gr. 6, 7 & 8; particularly useful for students who were less successful in school
- Gr. 12 teachers & students more critical of the devices, finding age & curriculum appropriate “apps” was a problem

# Research on iPod Touch Use in Classrooms



- teachers needed learn to find & download apps, develop techniques for managing these processes with students
- each classroom established a “digital commons”, host computer with a shared iTunes account to purchase apps and ‘sync’ devices
- ‘synching’ issues were greatest source of aggravation
- board-level privacy policy made retrieving assignments from the devices time consuming
- administrators spent time dealing with students not following acceptable use policy
- provides less insight into how iPod Touch impacts student learning

# Using New Technologies in Intermediate Classrooms Project Report

- Outline of our research process
  - Data Collection & Analysis
    - Online Teacher Questionnaire
    - Classroom Observations & Follow-up Teacher Interviews
    - Open Space Technology Session
    - iPod Touch Teacher Interview



# Online Teacher Questionnaire

## Participants

- Grade 9 mathematics teachers with IWBs (OCSB)
- Grade 7 & 8 teachers with IWBs (RCDSB)

## Items

- 8 selected-response items, 7 constructed-response items
- demographics, usage habits, perceptions of student learning, implementation issues & key supports

## Administration

- Feb - Mar 2011
- 62.5% response rate, 15 teachers

# Sample Questionnaire Items

**How often do students in your mathematics class(es) share their work using the interactive whiteboard?**

- Every class
- Most classes
- Occasionally
- Never
- Other, please specify:

**Please describe how STUDENTS in your classroom typically use the interactive whiteboard.**



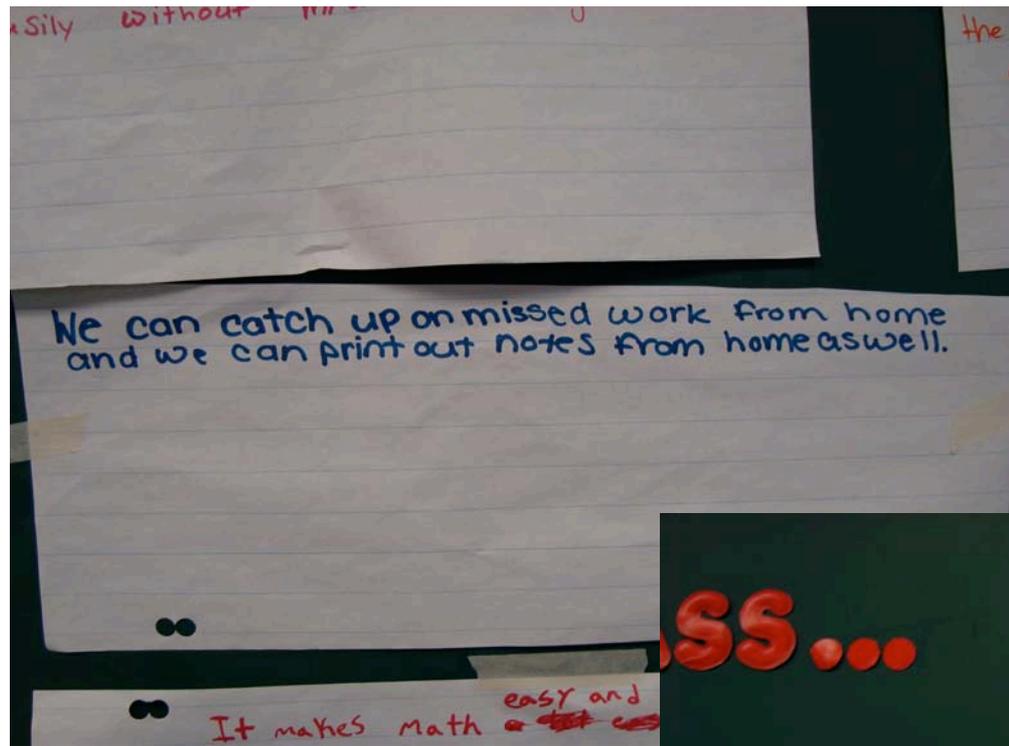
# Classroom Observations & Follow-up Interviews

- 75-90 min observation session in each board
- 20-30 min follow-up interviews, recorded & selectively transcribed
- screen captures from IWB, photos & other lesson artifacts
- *Rachel* 7 yrs teaching, Gr. 9 Academic & Applied math, 2<sup>nd</sup> year teaching with IWB, home purchase plan for graphing calculators, 80-90% of students own one
- *Fiona* 20 yrs teaching, Gr. 7 homeroom, 1<sup>st</sup> year teaching with IWB, part of a Netbooks pilot project



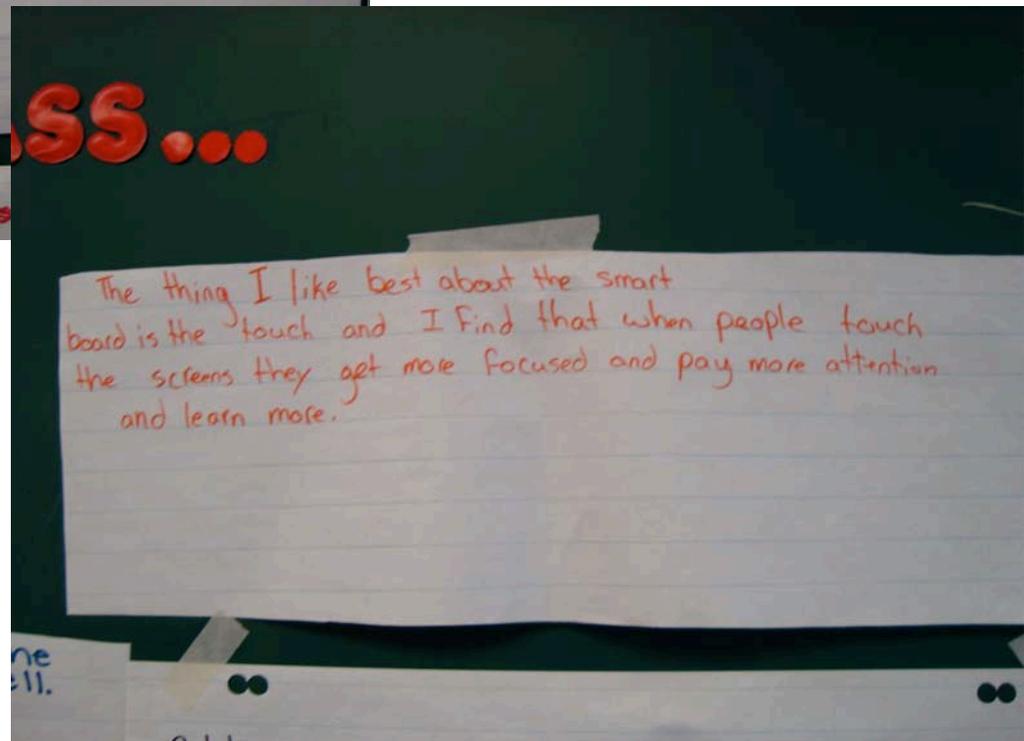
# Open Space Technology Session

- students in same OCSB Gr. 9 Applied math classroom where the observation session was conducted
- student survey using classroom response system (i.e. clickers)
- *Open Space Technology* enables a group of participants to share diverse perspectives
- typically used in meetings & workshops, beginning to be used as a method of data collection
- advantages for research
  - issues emerge from participants rather than being suggested by researchers
  - seems to engage students to a greater extent than traditional focus group or interview approaches



“We can catch up on missed work from home and we can print out notes from home as well.”

“The thing I like best about the SMART board is the touch and I find that when people touch the screen they get more focused and pay more attention and learn more”



# iPod Touch Teacher Focus Group/Interview

- planned a focus group interview with teachers using iPod Touch in their classroom and to observe a class while iPods were being used
- due to scheduling constraints we conducted one extended (70 min interview); audio-recorded & selectively transcribed
- *Charles*
  - over 30 yrs teaching experience
  - high school teacher in contemporary studies department
  - pilot project with access to 15 iPod Touch devices
  - two teachers in other schools also participated in the pilot project
  - recently installed school-wide wireless internet access



# Using New Technologies in Intermediate Classrooms Project Report

- Observations

## Teacher's Perspectives

- Characteristics of IWB & iPod Touch Use
- Perceived Effects of IWB & iPod Touch on Student Learning
- Support for Teachers using IWBs & iPod Touch

## Students' Perspectives

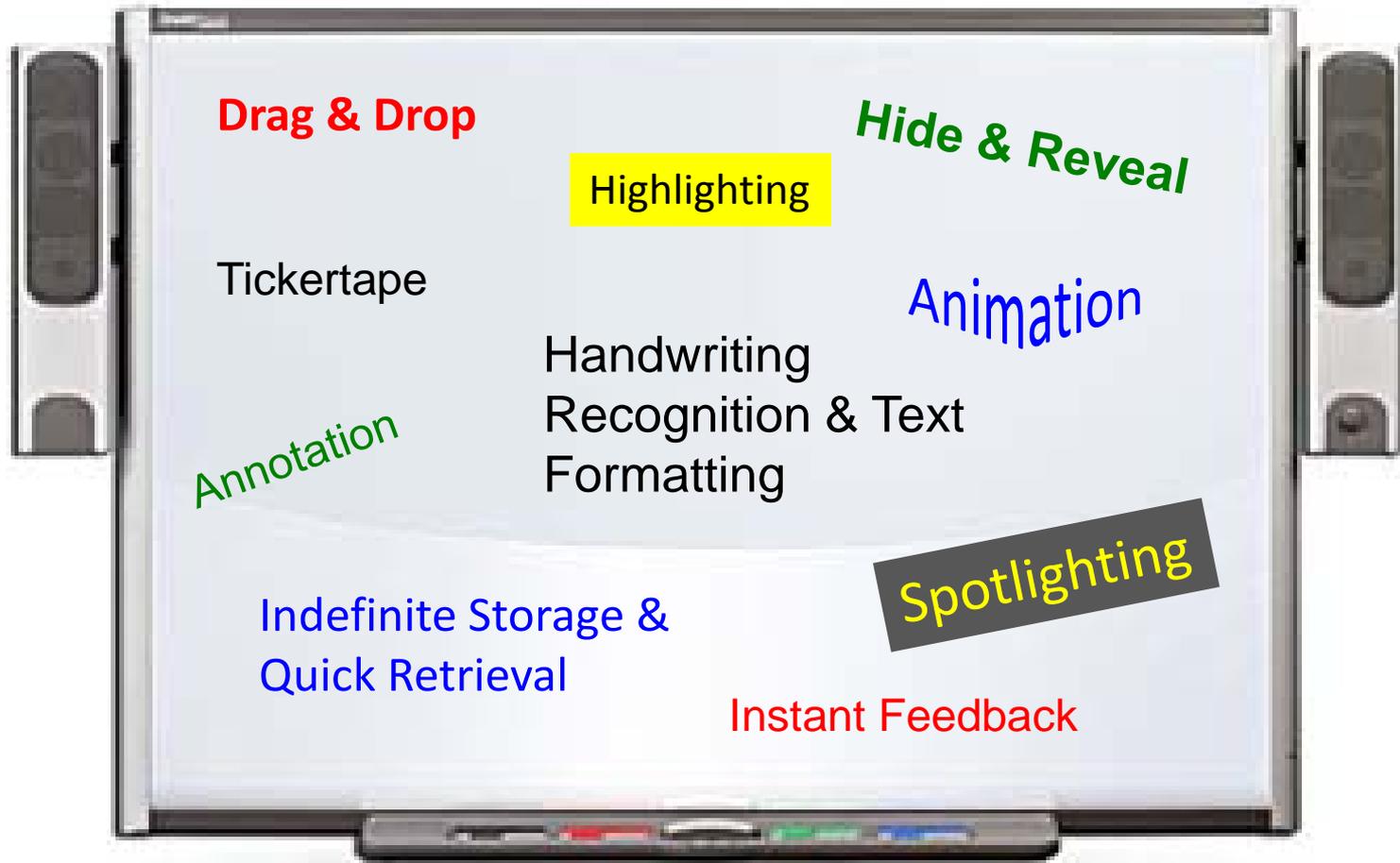
- Characteristics of IWB Use
- Perceived Effects of IWB on Student Learning

## Key Observation #1

Teachers use of IWB technology begins with an emphasis on use as a display and gradually transitions into use of the more dynamic and interactive features of this technology.

- intermediate math teachers in both boards report using their IWBs frequently but less than 1/3 described students using the interactive features
- classroom observation teachers were using a variety of math specific software & many interactive features

*“The IWB can be more than a projector and more than a blackboard if you have the interactive tools to go with it, otherwise it’s just a whiteboard” (Fiona)*
- at least 5 of the 10 features identified by Mercer et al. (2010) were used in the two classes we observed



# Features of IWB Use that Support Learning

(Mercer et al. 2010)

## Key Observation #2

IWBs are a complex technology that can take approximately two years to incorporate into teachers' classroom practice.

- Rachel (Gr. 9) indicated it had taken her about 18 months to incorporate the IWB into her Gr. 9 Applied math program

*“When I first got the SMART Board I was so concerned with the functionality of the technology that I actually lost a little bit of the math for a while”*

- Fiona, (Gr. 7) in her 1<sup>st</sup> yr. with IWB, still spending time resolving technical issues & developing classroom management techniques to integrate the IWB & Netbooks into her pedagogy
- Charles, 1<sup>st</sup> yr. with iPods, technical aspects less challenging than IWB but time still needed to find apps & websites, develop routines for distributing, collecting & charging iPods

## Recommendation

Plan for at least 2 yrs with adequate support in place for new technologies to be integrated into classroom practice. Explicit statements to this effect may reduce teachers' feelings of frustration & sense of being overwhelmed

## Key Observation #3



Teachers are creating and managing a complex and dynamic “digital landscape” or “technological ecosystem” in their classrooms.

- **Rachel** integrated IWB, a laptop, a projector, a document camera, student owned graphing calculators, software applications, internet access & a class website
- **Fiona** integrated IWB, class set of Netbooks, and a variety of online resources
- **Charles** found apps & websites for iPod Touch but found the lack of integration between the iPod Touch and the IWB be a serious limitation
- **several teachers** on the questionnaire described their integration of IWB with other technologies in their classrooms
- digital landscape is continually changing

## Recommendation

Infrastructures, including face-to-face & online venues, should be set up to allow teachers to share their experiences with integrating various combinations of technology into the “technological ecosystem” of their classroom.

## Key Observation #4

Both students and teachers believe that IWB and iPod Touch devices increase the level of engagement of students.

- all 4 data sources support this finding
- consistent with Crichton et al. (2011)  
*“The IWB is just so much better at making sure that the students are with me”* (Fiona)  
*“It’s interactive and a great and fun way to learn math easily without misunderstanding the lesson”* (Gr 9. Applied math student)
- need to research which aspects of these technologies contribute to increased engagement
- need for research into whether some students find these technologies distracting; may not be beneficial for all students

## Key Observation #5

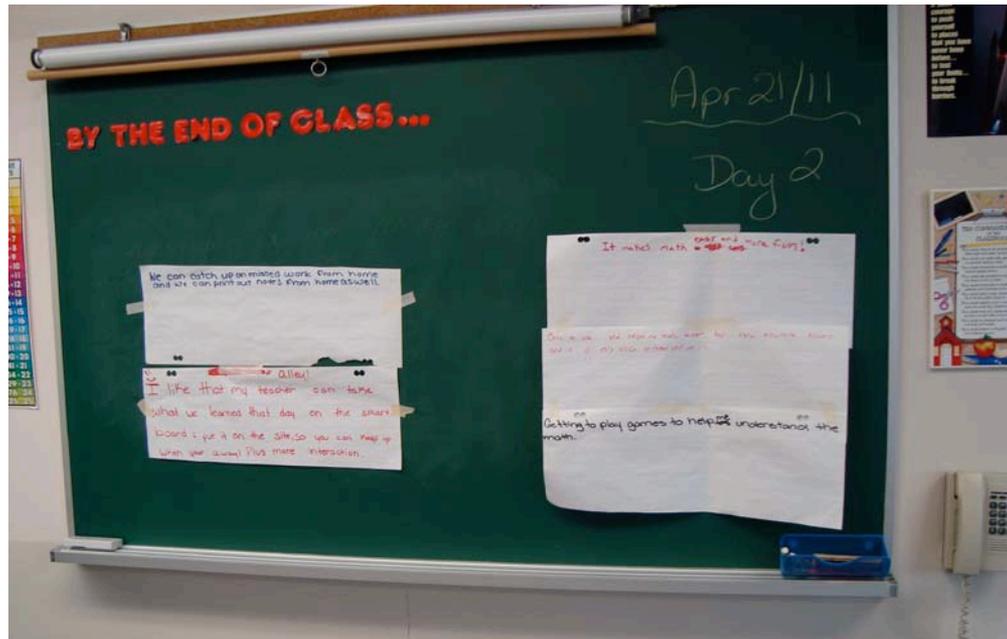
Both students and teachers believe that the specific features of the IWB and its peripherals enrich their mathematics learning.

- all 4 data sources support this finding
- both students & teachers indicated that visual representations of math concepts and the ability to move objects around enhanced understanding
- 85% of students felt IWBs should be installed in all classrooms
- only 58% felt the IWB had actually helped their own learning
- enthusiasm & belief exceeds available evidence and there is a need for more extensive research

## Key Observation #6

Some students and teachers have the perception that the IWB and iPod Touch technologies are particularly beneficial for students who are struggling academically.

- several questionnaire responses, teacher interview comments & student responses support this finding
- visual representations seen as particularly beneficial for struggling students
- ability to get up from their seats and interact with objects on the IWB also perceived as beneficial for struggling students
- more research needed to see if there is evidence to support this perception\*\*\*
- need to better understand what aspects of these technologies benefit struggling students and consider which students may be disadvantaged



*On a smartboard you can transfer the lesson online from the smartboard directly with the exact teachers wrighting. It helps People with disabilty's who cannot wright out notes to get the exact note the teacher wrote. Plus it IS WAY HARDER to catch up on a chalkboard.*

*SMART board =*



## Key Observation #7

Teachers require time and ongoing support to successfully integrate these technologies into their classroom practice.

### Five Forms of Support

- **Working with colleagues:** a key form of support in questionnaire responses and teacher interviews; consistent with other research studies
- **Board consultants and/or PD workshops:** more effective if a only a little information and a few features are demonstrated at any one time; teachers need to try out a few new features before learning about others
- **Time:** repeatedly emphasized by all teacher participants; consistent with other research studies

## Key Observation #7

Teachers require time and ongoing support to successfully integrate these technologies into their classroom practice.

- **Students:** a key form of support in both observation classrooms; troubleshoot technical issues; alert teachers to features of IWB based on previous experience in other classrooms; students & teachers co-construct the “technological ecosystem” being created in the classroom
- **Access to developed curriculum-related resources:** need for access to fully developed, curriculum specific resources for use with these technologies such as grade & curriculum specific iPod apps, TIPS lessons for Gr. 9 math, National Library of Virtual Manipulatives, IWB lessons included on the Nelson website

## **Recommendation**

Create an online repository of resources by subject & grade for IWB and iPod applications which teachers can contribute to and make use of as they incorporate these technologies into their classrooms.

## Key Observation #8

Support that addresses both technological & pedagogical aspects of is more beneficial than providing technological support alone.

- questionnaire responses suggest that many teachers make limited use of interactive features of IWB and math specific software for IWBs
- focus of existing support in both boards has been on negotiating technical issues
- more attention needs to be given to effective pedagogical approaches for using IWB technology in combination with various other devices and new software

## Recommendation

All forms of support, whether focused on basic technical competencies or more advanced usage, should maintain the centrality of the pedagogical goals for a technology's use.

## Key Observation #9

IWB technology promotes and facilitates the recording & storage of lessons which is beneficial in several ways.

- IWB facilitates recording of all teacher & student annotations during a lesson
- supports teachers in with lesson planning process because annotations made during a lesson can be saved directly into the file
- next time the lesson is taught teacher can make adjustments based on the information in the file
- enhanced recordkeeping can also be beneficial as teachers share with one another
- external researchers and teachers engaged in practitioner inquiry can access detailed screen captures from a series of lessons and these become a rich data source

## Areas for Further Research

- return to Fiona's classroom that was in the 1<sup>st</sup> yr of IWB use to see how 2<sup>nd</sup> yr. is going
- repeat questionnaire to see how use has changed for these teachers
- conduct more extensive case studies with multiple observation sessions
- study IWB use in other subject areas and/or at other grade levels
- review professional development opportunities & other forms of support

# “Old News” & “New Ideas”

## Post-it Note Pile-up



# Getting Started with Open Space Technology

## **Step One:**

*The aspect of integrating new technologies into classrooms that I am most interested in/concerned with is .....*

## **Step Two:**

Post your concern on the wall for others to read and take a few minutes to read over the concerns of others.

(to be continued after lunch.....)

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