



# The Introduction of Interactive Whiteboards in Science Classes

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# Malta, an island country

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- ▶ An archipelago in the Mediterranean Sea, population of just under 450,000



# Maltese Education System

- ▶ An education system based on the **British model**
- ▶ It is divided into three main branches: a 6 year **primary** cycle, 5 years of **secondary** education and **tertiary** education
- ▶ Different streams of education
  - Public, state-run system
  - Church administered system
  - Private/ Independent institutions
- ▶ State schools have been grouped into **college networks** (*BSS & GSS*)



# Science Education Malta

- ▶ Primary Science Education
  - Focusing on the natural curiosity of children
  - Develop fundamental scientific concepts
- ▶ Secondary Science Sector
  - Form 1 and 2: Integrated Science
  - Form 3 and 4: Biology, Physics and Chemistry



# The Introduction of Interactive Whiteboards

- In 2009 the Maltese Government introduced IWBs in **state schools**
- Initially in all **science labs** and in year 5 classes
- All **state school classes** around Malta and Gozo were equipped with IWBs by the end of **2012**



# Research Questions

- ▶ How **frequently** are IWBs being used by **science teachers** and what **IWB features** are they using?
- ▶ Is the IWB being used as a '**pedagogic tool for change**'?
- ▶ What are the **science teachers' attitudes** and **HoDs' perceptions** on the IWB introduction?
- ▶ What are the **learners' reactions** towards *the use* of the IWB during science lessons?
- ▶ What **challenges** do teachers encounter when using the IWB?



# Methodology

- ▶ **Interviews** with Science HoDs from ten different colleges
- ▶ **Questionnaires** with science teachers working in state school: percentage response rate of **82.2%**

Gender	No. of Participants	Percentage of population under study
Male	63	42.6%
Female	85	57.4%
Total	148	100%

Table 1: Cohort of participants by gender

Age range	No. of Participants	Percentage of population under study
20-29 years	56	38.1%
30-39 years	56	38.1%
40-49 years	28	19.0%
50-60 years	7	4.8%

Table 2: Cohort of participants by age range

- ▶ **Focus groups** with Form IV science students

The combination of quantitative and qualitative data provided a *useful triangulation* that *helps to clarify* the complexity of human behaviour

# Accessibility of the IWB

- ▶ Most teachers have access to an IWB during **each and every lesson** (89.2%)
- ▶ Since **10.8%** of teachers do not have access, schools opt for a booking scheme:

*“ For Biology and Chemistry, the IWB in our school is available in every lesson because lessons are held in labs. For Physics, half the lessons are held in labs, but if the teacher wants to use the IWB, a teacher can book and rearrange to use it, because there are enough classes in which the IWBs are installed”*



Male HoD of a BSS

- ▶ The use of the IWB depends on the teacher:

*“My Physics teacher always uses the IWB, but Biology and Chemistry teacher rarely does ...he just uses it to put up pictures”*



Form IV student in a BSS



# The use of the IWB

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- **73.7%** of science teachers make use of the IWB during *most* or *every lesson*
- **26.3%** of science teachers have decided to make less or no use of the IWB

Frequency of IWB use	No. of Participants	Percentage of whole population
Never	4	2.7%
Only for practical lessons	2	1.4%
Occasionally	33	22.3%
Most lessons	43	29.1%
Every lesson	66	44.6%

*“The fact that the IWB has been installed in our labs for quite some time and some teachers still do not use, is definitely disappointing”*



Male HoD of a BSS

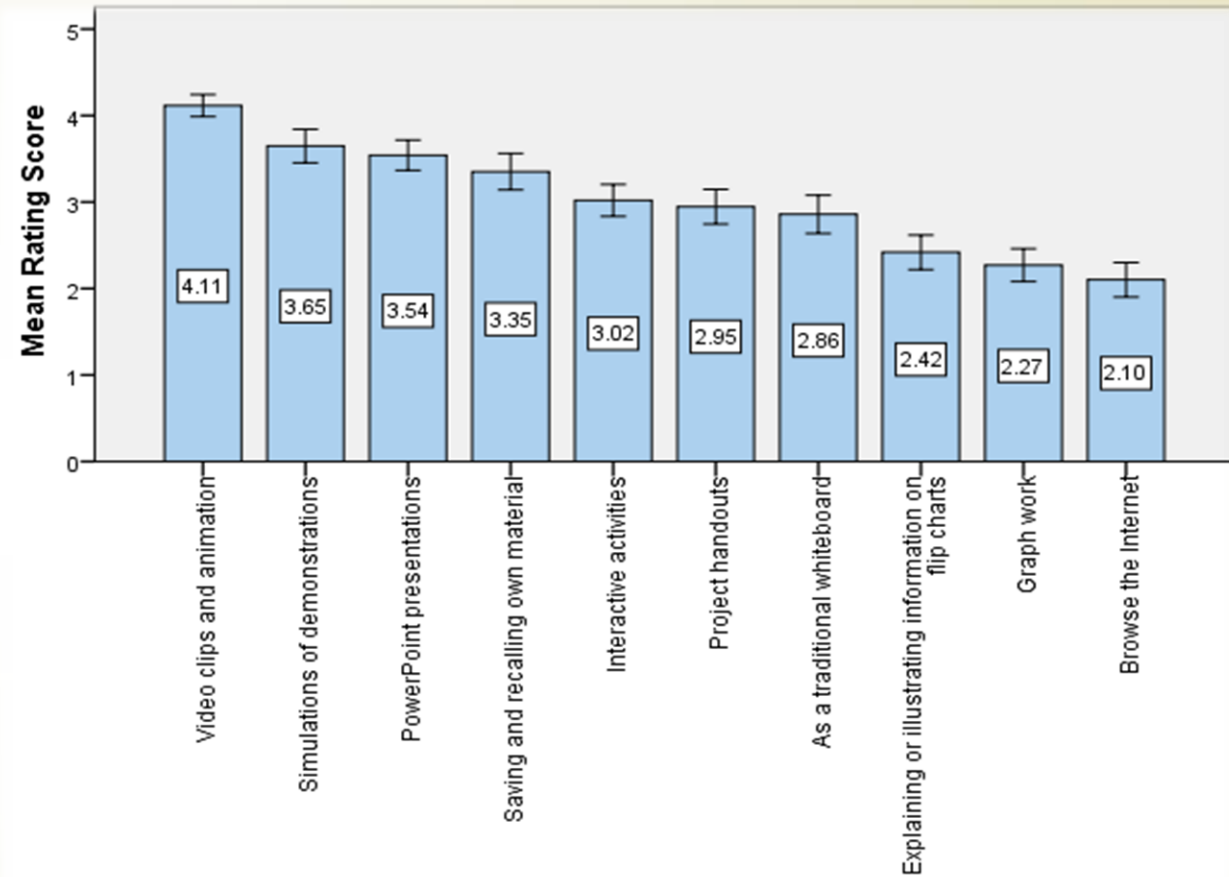
*“Science teachers are more into technology than art teachers...they are not so familiar with ICT. I know that most language teachers do not use the IWB”*



Female HoD of a GSS

# Used Features ...

- ▶ Most IWB features used:
  - Video clips
  - Simulations and Demonstrations
  - PowerPoint presentations
- ▶ These particular features coincide
  - Interactive activities
  - Project handouts
  - As a traditional whiteboards



Is the IWB reinforcing further the **traditional**, teacher-centred approach?

# Used Features: Learners' Reactions

*"Teachers put up notes and past papers...but sometimes they also show videos and rarely make use of the internet"*



Form IV student in a BSS

*"Mostly for writing notes and to put up PowerPoint presentations. Sometimes they also show us video clips"*



Form IV student in a GSS



- ➔ Do the **teaching styles** of **teachers** match **students'** learning preferences?

*“Teachers put up our pack of notes and I like it because I can easily follow the explanation”*



Form IV student in a BSS

*“Once our Chemistry teacher carried out a group activity, where we had to prepare a presentation to explain a topic. I didn’t like the fact that students presented their work. I know the teacher could have explained it better.”*



Form IV student in a GSS

# Impact on Teaching and Learning

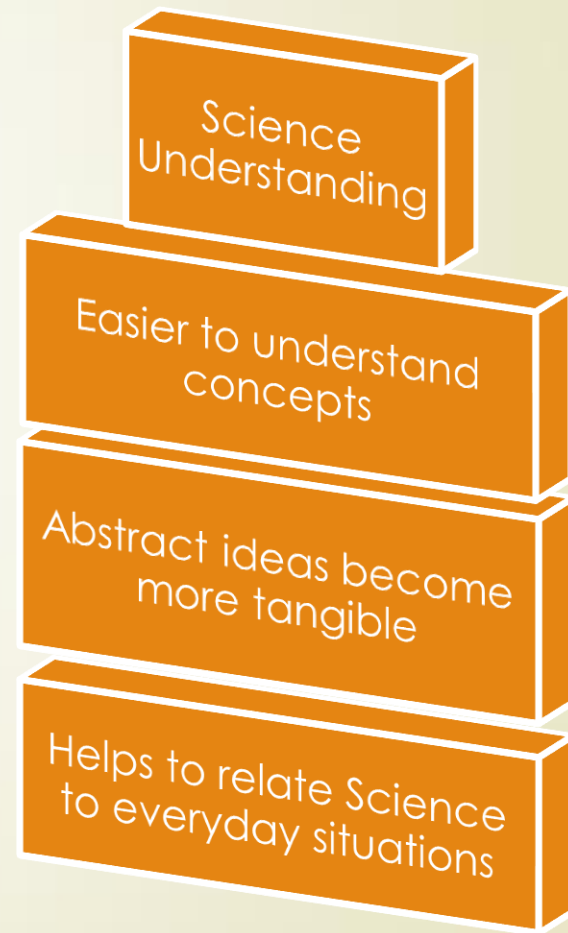


- Teachers' Reactions on the IWB use:
  - Students **engage more** in discussions and questioning
  - More **interactive lessons** can be planned
  - IWB makes lessons more **enjoyable, exciting** and **fun**
  - More time for students to **critically think**
  - Improves **science understanding**

*"A powerful tool, since you have everything at your fingertips, you can vary, link and improvise"*



Male HoD in BSS



# Impact on Teaching and Learning



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- ▶ Students' perceptions on the IWB use

*“I love it when teachers relate science to situations by the use of videos. With the IWB we can discuss things, because we can ask related questions”*



Form IV student in a GSS

*“I don't know whether it's because I love technology, but I can participate more when the IWB is used. Lessons are more interesting with colourful slides to follow”*



Form IV student in a GSS

# ICT : amplifying learning

*“The IWB helps in showing experiments that are impossible to do in a lab”*



Female HoD in a BSS

*“The simulations provide an opportunity to stop a an experiment, providing time for students to predict results and think”*



Male HoD in a BSS

▶ Students appreciate the use of simulations, however:

*“ I enjoy lessons were teachers use simulations, but I'd rather have the real thing.”*



Form IV student in GSS



# ICT: amplifying learning

- ▶ Creating a virtual classroom where students use a familiar tool

*“Resources that I don’t have time to use in class, are uploaded in my blog. Providing additional information, notes and videos”*



Female Physics teacher in GSS

*“I don’t project notes on the IWB, it’s completely against the whole concept. I discuss the topic in class and upload notes on my blog”*



Male HoD in BSS





# Learners' IWB use & preferences

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- ▶ Students' use of the IWB is limited to **clicking** and **indicating answers**.
- ▶ "Technical interactivity" can weaken the learning process



- ▶ Students still showed willingness to manipulate the IWB

*"If teachers could allow us to use the IWB, we would love that!"*



Form IV student in a BSS

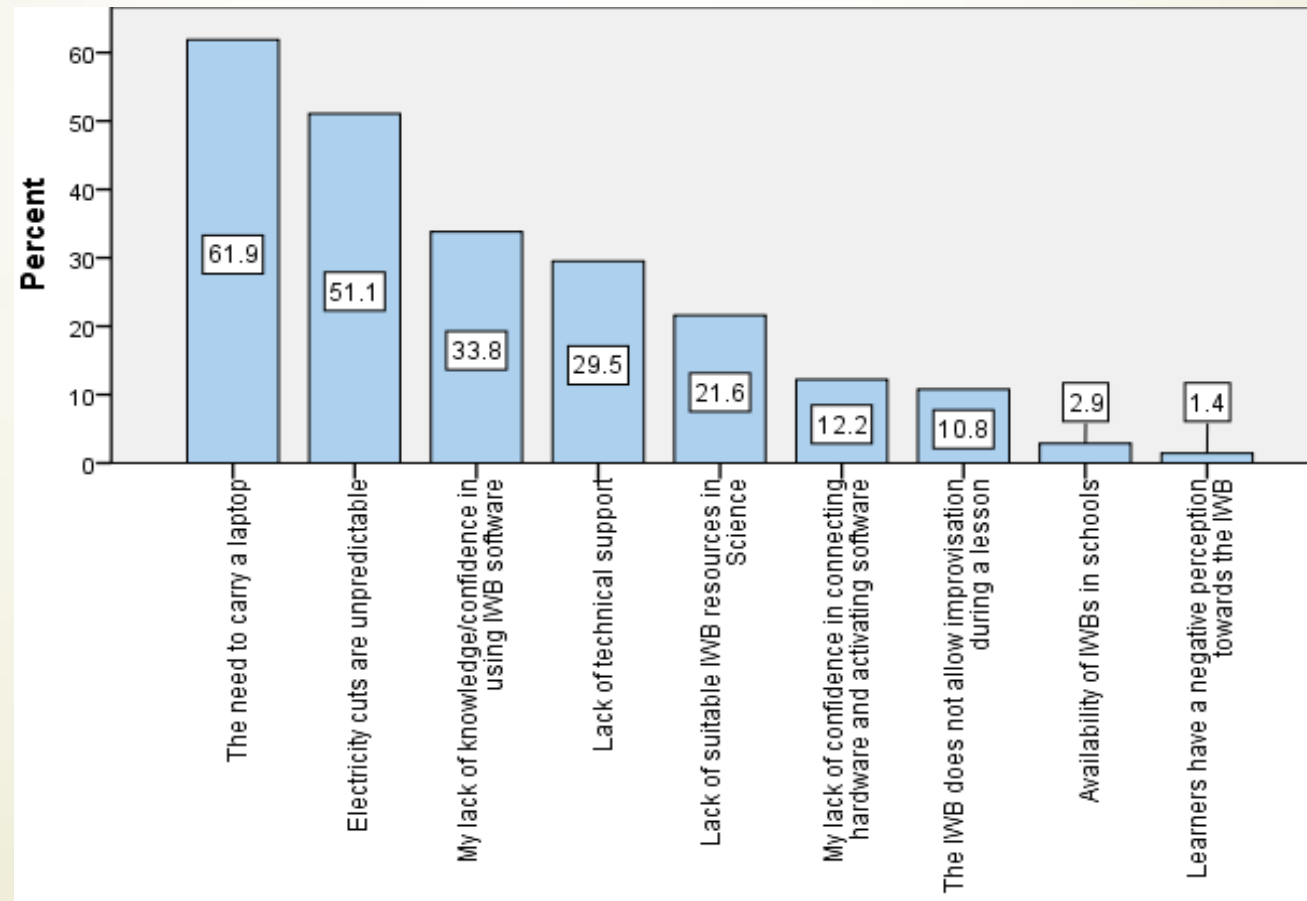
*"Using the IWB and doing group work would be ideal because we are not just restricted to listening to the teacher. It involves teamwork"*



Form IV student in a BSS

# Challenges and Problems

- **Main challenges** encountered when using the IWB
  - The need to carry a laptop (61.9%)
  - Electricity cuts are unpredictable (51.1%)
  - My lack of knowledge in using the IWB (33.8%)



# Challenges and Problems

- Teachers also reported that they lack sufficient time to prepare and use resources because of the vast syllabus

*“Lack of time and too much content to be covered”*



Female Physics teacher in a BSS

*“The vast syllabus limits the teachers...the ever present time constraint”*



Male Physics teacher in a GSS



# Teachers' lack of knowledge & training



- ▶ **33.8%** of teachers claimed a lack of confidence when using the IWB
- ▶ Students are aware of their teachers' lack of ICT skills:

*“ Teachers waste time trying to figure out how it works...”*



Form IV student in BSS

*“ Teachers have problems with using the IWB, but they were even more prominent last year since they were newly introduced”*



Form IV student in BSS

# Teachers' lack of knowledge & training



- ▶ **98.6%** of teachers have attended IWB training sessions
- ▶ **85.6%** of them still feel the need *to learn more* on the IWB multiple uses
- ▶ Only **13.3%** of teachers have had the opportunity to participate in **'pedagogical' training**

*"We did have training sessions, but I reckon that training should be more focused and specific...Secondary and Primary teachers participated in the same training sessions"*



Male HoD in a BSS

## To sum up: Features used



- ▶ Teachers' feedback towards the use of the IWB has been **positive**
- ▶ Teachers tend to use **several multimedia** resources in their lessons and **value the IWB big screen**
- ▶ The IWB:
  - Creates more flowing, enjoyable lessons
  - Increases motivation and attentiveness
  - May reinforce further the **instructive teaching approach**. *This was also suggested by Kennewell in 2005*

# To sum up: Science Understanding

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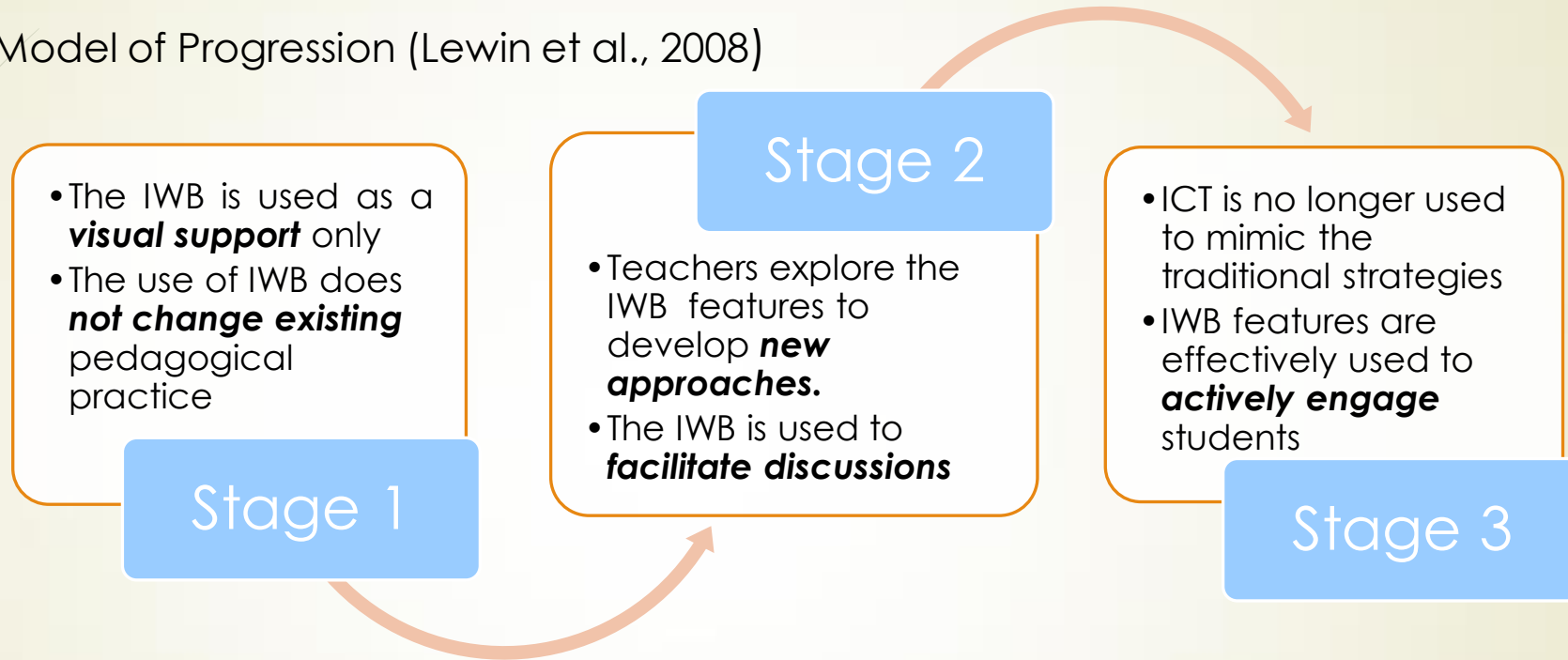
When used effectively the IWB

- **Increases interactivity** with the use of simulations and videos
- Allows more time for **questioning** and **discussions**
- Visual demonstrations help students experience experiments that cannot be carried out in the lab. *This is coherent with another study carried out by Betcher and Lee in 2009*



# To sum up: Pedagogic tool for change?

Model of Progression (Lewin et al., 2008)



- Science teachers seem to be positioned in Stage 2
- Exploring new features to move away from traditional teaching methods
- Given more support, most teachers can gradually move towards Stage 3



# To sum up: Learners' Perceptions

- ▶ Students are **very optimistic** about the IWB use
- ▶ Students alluded that
  - the visual display increases their **concentration**
  - technical problems and teachers' lack of ICT skills waste time
- ▶ The IWB is **hardly used** by the learners. As indicated in another study by Hennessey et al (2007)



# To sum up: Challenges and Training

- ▶ Teachers' claimed to **lack confidence**
- ▶ Teachers appealed for more subject related training. *This reinforces the need for more pedagogical training as suggested in Busuttil's study in 2011*
- ▶ Training and support help initiating the gradual **change in pedagogy**



# Conclusion

- ▶ The initial gloss will eventually wear off
- ▶ The IWB can enrich the teaching and learning experience
- ▶ A shift towards making the **Interactive Whiteboard** more *interactive*



Thank you  
for your attention