International Conference
NEW PERSPECTIVES in SCIENCE EDUCATION
5th Edition

Innovations in Science Education -

The Introduction of the Interactive Whiteboard in Maltese Science Classes

Chanelle Attard[1], Charles Bonello[2]
[1]St Clare College, Boys Secondary School
[2]University of Malta
(Malta)
[1]chanelle@live.com, [2]charles.bonello@um.edu.mt

Abstract

This study was conducted following the introduction of the Interactive Whiteboards [IWBs] in science classrooms in Maltese state schools. One aim of the study was to determine the frequency and nature of use of this resource by science teachers. It also explored the challenges and needs that these teachers encounter when using these resources. A total of 148 science teachers participated in the research study out of a population of 180. The research also probed into the science administrators and students' views about the introduction of this resource. Ten interviews with administrators and ten student focus groups were held with participants coming from all state colleges.

The administrators believed that when used effectively the IWB can support students' interactivity and understanding. Furthermore, both teachers and students agreed that simulations and videos help to present scientific concepts in a well-illustrated manner that supports learning. This latter feature of the IWB prompts teachers to explore its potential and move away from traditional teaching approaches where the IWB is used as a projector. The move towards contemporary teaching approaches however is not a natural outcome of the introduction of the IWB in schools as this study shows that some teachers still use the whiteboard as a presentation tool. It seems that some teachers are still reluctant to transform their pedagogical practices even if they recognize the tool's potential in increasing participation, enjoyment and motivation amongst students. This reluctance may be due to challenges which tend to hinder use of the resource in a classroom.

The most frequently cited challenge amongst teachers is the lack of confidence they feel when using such a resource. This may be attributed to the lack of specialized pedagogical training and technical support. Administrators and teachers participating in this study emphasised the need for adequate pedagogical training in IWB use, efficient ICT support and adequate supplies of educational software resources. This finding prompts the consideration that apart from adequate and functioning equipment, schools need to develop an ICT management team to support teachers' efforts and encourage the use of this resource.

1.0 Introduction

The introduction of the IWB in Maltese secondary schools provided a significant challenge to the administrators, teachers and learners involved in this innovation. The IWB was introduced in Maltese schools in 2011 but its use in the Maltese science classroom has never been researched. International research studies provide a number of insights on aspects linked with the introduction of this innovation in other countries. The majority of these studies report that the use of IWB improves the learning and teaching experiences by promising an increase in interactivity [5] [10]. Other studies claim that the IWB may be underused, as some teachers use this tool as "glorified blackboards" [6]. This study probes into the experiences of Maltese administrators and science teachers when using the IWB. Furthermore the learners' feedback about the way the IWB was put to use in the science classroom was also investigated.

1.1 Teacher progression in IWB classroom use

It is argued that the IWB can transform pedagogy as its classroom use provides "increased pace of delivery, increased use of multimodal resources, incorporating image, sound and movement in new ways; and more interactive styles of whole class teaching" [7]. The features of the board allow science teachers space for questioning and communication so that these together with their students can discuss and make sense of science concepts [8].

Ultimately such a tool needs to be used by teachers as a pedagogical resource that can help them address curricular topics [6]. It seems that both teachers and students credit more the IWB's multimedia and presentation features than the interactive features that are quite particular to this resource [9]. In a research study on IWB use [6], the developmental progress made by a teacher was classified according to a three-stage model of progression [Fig 1].

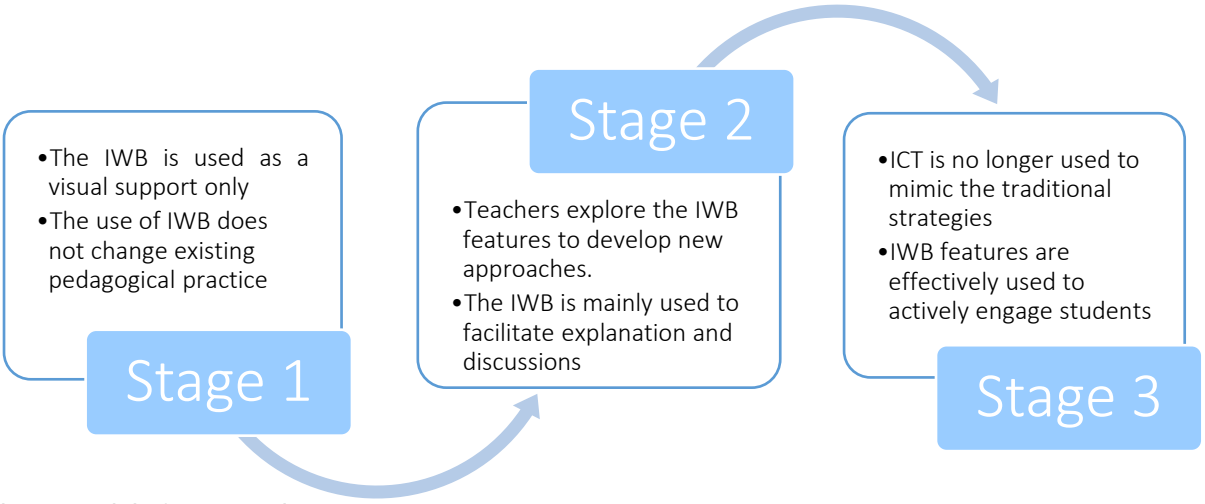

Fig. 1: Model of Progression

In order to progress from stage 1 to stage 3, teachers should be given time to familiarize with the technology and learn how to use the IWB so that they can improve their pedagogical practices [9]. Identifying the teachers' challenges and needs that arise when they use the IWB can give an indication about the changes that must be carried out to maximise the benefit of this cognitive tool whilst minimizing any barriers that hinder learning.

2.0 Research methodology

In this research study, data was generated by the administrators, teachers and students involved in the introduction of the innovation. Interviews were held with the ten Heads of Department [HoDs] found in state schools so that the administrators' view about this process of dissemination was explored. Furthermore, questionnaires were used to gain knowledge about the science teachers' views about this experience. Out of the 180 questionnaires distributed to all science teachers, 148 questionnaires were collected. The tables 2.1 and 2.2 show the teachers' cohort grouped by gender and age range.

Table 1: Cohort of participants by gender

Gender	No. of Participants	Percentage of Population under study
Male	63	42.6%
Female	85	57.4%
Total	148	100.0%

Table 2: Cohort of participants by age range

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%

Insights on how learners experienced the use of the IWB during science lessons were obtained from focus groups. Each focus group contained ten [Form IV] randomly chosen science students from each school where the interviews with the Heads of Department [HoDs] had been previously carried out.

3.0 Results and discussion

The feedback generated from administrators, teachers and students of science classes helped to provide insights on the nature and frequency of IWB use in state schools. Furthermore, it investigated

how the introduction of this technology has affected the teaching and learning experiences of these participants.

3.1 Accessibility and use of IWB

Maltese state schools have an IWB in all science laboratories and during the time the research was conducted, IWBs were also being installed in every classroom. Most science teachers (89.2%) have access to an IWB during every lesson and despite the fact that 10.8% of them do not, the issue is partially resolved since teachers can opt to book classrooms having IWBs.

The administrators' view on the use of the IWB in science lessons is marked by a positive attitude, advocating that the effective integration of the IWB can bring about the necessary changes to transform creative ideas into actions. The HoDs also emphasised that teachers need to learn how to tap further into other features of the IWB because the "wow-factor" can diminish after prolonged use.

Data generated from the questionnaires shows that 73.7% of teachers make use of the IWB during most or every lesson. This means that 26.3% of teachers have decided to make less frequent or no use of the IWB. Probing further into this issue, data from this study indicates that choice is not an age related issue as some of these teachers have only been teaching for, at most, seven years.

Teachers reported that the IWB is mainly used to show presentations, video clips, animations and demonstrations. In Fig. 2 below, the mean rating score for each item ranges from 1 to 5, where 1 corresponds to "not used at all" and 5 to "used all the time. Students also stated that teachers tend to show video clips and simulations on the IWB; however they also mentioned that the IWB is used by teachers to project notes. This seems to imply that teacher-centred methods are still prevalent and sometimes the IWB is possibly being used to transmit, rather than generate knowledge.

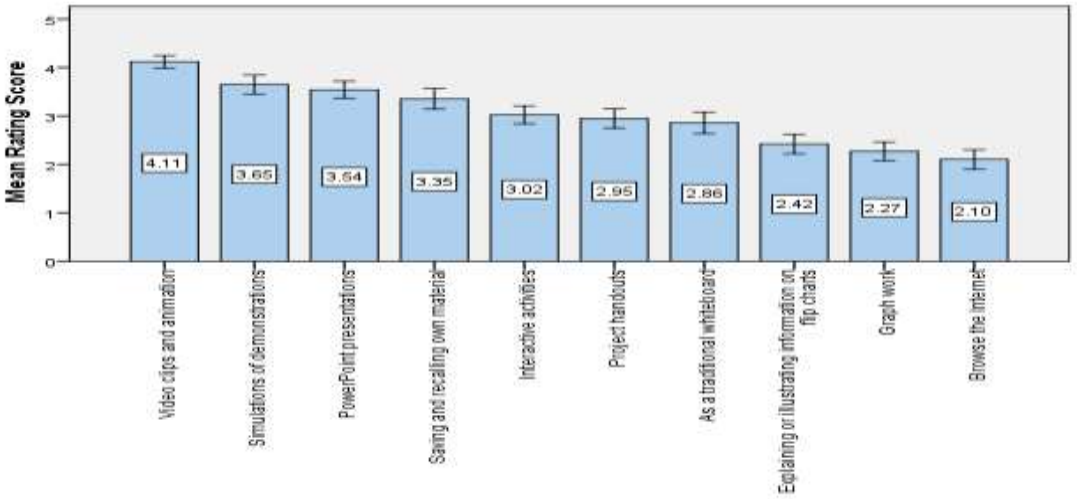

Fig. 2: IWB features teachers use

3.2 The IWB - a 'pedagogic resource' for change?

Through the teachers and learners feedback about the use of the IWB, it could be deduced that this resource has brought about significant changes and benefits to classroom practice. Maltese teachers use the IWB for activities that increase students' participation such as simulations, videos and group work presentations. The feedback given also indicated that the IWB created more time and space for students to engage in thinking. Other findings however show that, regrettably, not all teachers are making use of the interactive features of this resource. This implies that even if the IWB has the potential to create student centred classrooms, when used as a presentational tool it only emphasises further traditional methods.

Evidently, the effective use of the IWB depends on the teachers' pedagogical approaches and choices. In the Model of Progression [6] referred to earlier on, science teachers in Maltese state schools seem to be positioned in the second stage, meaning that most teachers are currently still exploring new features to move away from traditional teaching approaches. Given more support,

experience and familiarization with the resource, most teachers can gradually move towards the third stage of the model of progression and hence transform their classroom practice.

3.3 Learners' perceptions on the use of the IWB during science lessons

Learners are also optimistic about the use of the IWB, since the presentation of content is now visually more appealing. They argue that the various uses of the IWB [Fig. 3] that they experience in class indicates that there is increased opportunity for interaction and discussion and this helps them in visualising the abstract and hence improving understanding. Learners showed a general desire to interact more with the IWB, since physical manipulation of the board is limited in the present classroom setting. They have also affirmed that although they enjoy simulations and video clips, visual experiments should never replace the hands-on practice.

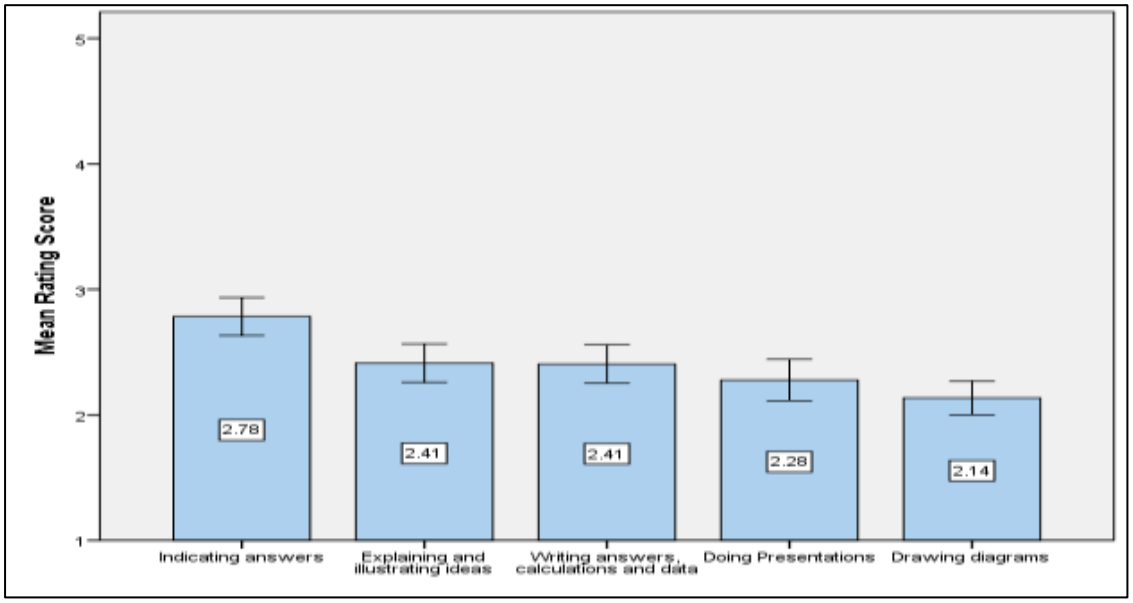

Fig. 3: Uses of the IWB by learners during a typical week

3.4 What challenges do teachers encounter when using the IWB?

A percentage of teachers [61.9%] regard the need of carrying a laptop as the main disadvantage. This could be resolved by providing fixed laptops in every classroom. This suggestion would reduce wasted time on connecting/disconnecting the IWB with different laptops and reduce issues of incompatibility between resources. On the other hand, 33.8% of teachers claimed a lack of confidence when using the IWB. Female teachers seem to have more problems than males with regards to handling technology as the lack of knowledge or confidence reported by female teachers [43.8%] is higher than that of male teachers [20.3%].

As stated earlier on, data generated in this study indicates that teachers need further training and support. Although 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. This is possibly due to the fact that only 13.3% of teachers have had the opportunity to participate in 'pedagogical' training. Most teachers who have attended such training sessions feel comfortable in using the IWB, in contrast to those who did not participate, as Fig. 4 illustrates.

The demand for more training is understandable because teachers have not been trained adequately on the pedagogic aspects of the IWB; a limitation which is probably the cause of why IWBs are sometimes reinforcing traditional methods. To transform existing teaching patterns, policy makers need to provide adequate pedagogical training [1], efficient ICT support and supplies of educational software resources.

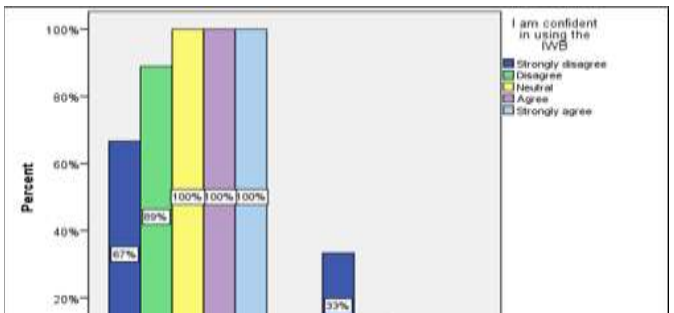

Fig. 4: Teachers training courses participation and confidence in using the IWB

4.0 Conclusion

The benefits of the presentation features of the IWB are being exploited by the frequent use of demonstrations, simulations and videos. Furthermore, both teachers and learners have a positive attitude towards the use of the IWB. However, teachers' use of this resource needs to focus on the specific purpose of increasing interactivity and dialogic classroom talk. A shift towards this will ensure that activities used in class enable scaffolding and active student learning in an attempt to make the IWB more interactive.

References

[1] Armstrong, V., Barnes, S., Sutherland, R., Curran, S., Mills, S., and Thompson, I. (2005). Collaborative Research Methodology for Investigating Teaching and Learning: The use of Interactive Whiteboard Technology. Educational Review, 57(4), 457–469.

[2] Burden, K. (2002). Learning from the bottom up – the contribution of school based practice and research in the effective use of interactive whiteboards for the FE/HE sector. Paper presented at Making an Impact Regionally Conference on Learning and Skills Research, Doncaster.

[3] Busuttil, G. (2011). The use of Interactive Whiteboards in Secondary Schools: a survey. Unpublished B.Ed. dissertation, University of Malta, Malta.

[4] Glover, D., and Miller, D. (2002). The Introduction of Interactive Whiteboards into Schools in the United Kingdom: Leaders, Led, and the Management of Pedagogic and Technological Change. International Electronic Journal for Leadership in Learning , 6 (24), 1-10.

[5] Higgins, S., Beauchamp, G. and Miller, D. (2007). Reviewing the literature on interactive Whiteboards. Learning, Media and Technology, 32(3), 213- 225

[6] Lewin, C., Somekh, B., and Steadman, S. (2008). Embedding Interactive whiteboards in teaching and learning: the process of change in pedagogic practice. Education and Information Technology , 13(4), 291-303.

[7] Moss, G., Jewitt, C., Levacic, R., Armstrong, V., Cardini, A., and Castle, F. (2007). The Interactive Whiteboards, Pedagogy and Pupil Performace Evaluation: An Evaluation of the Schools Whiteboard Expansion (SWE) Project: London Challenge. London: School of Educational Foundations and Policy Studies, Institute of Education, University of London. Retrieved April 22, 2013, from: http://eprints.ioe.ac.uk/905/1/Moss2007whiteboardsRR816.pdf

[8] Murcia, K. (2008). Teaching for scientific literacy with an interactive whiteboard. Teaching Science , 54 (4), 17-21.

[9] Slay, H., Sieborger, I., and Hodgkinson-Williams, C. (2008). Interactive whiteboards: Real beauty or just ‘‘lipstick”? Computers and Education , 51, 1321-1341.

[10] Smith, H. J., Higgins, S., Wall, K., and Miller, J. (2005). Interactive whiteboards: boon or bandwagon? A critical Review of the Literature. Journal of Computer Assisted Learning, 21 , 91-101.