

The Impact of Interactive Whiteboards on Teaching, Learning and Attainment

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Abstract: During the past three years the UK government has provided increasing funds for schools to invest in interactive whiteboard technology, together with research initiatives to evaluate the effectiveness of practitioner use. MirandaNet has been involved in the evaluation of interactive whiteboard technology and use for the past five years. This paper examines studies led and managed by MirandaNet, through the MirandaNet International Research Centre and MirandaNet Academy, into the ways in which interactive whiteboards have been used as essential tools to develop and implement school teaching and learning policies. The paper describes schools' ICT diffusion and integration strategies to enhance all aspects of teaching and learning through school improvement policies. The impact of the work on the schools will be outlined, together with an assessment of the changes in attitudes and attainment.

The Impact of Interactive Whiteboards on Teaching, Learning and Attainment

During the past three years the UK government has provided increasing funds for schools to invest in interactive whiteboard (IWB) technology. This technology has an impact on whole-class, group and individual teaching and learning, with the ability to extend the range of teaching and learning styles deployed in a classroom. This investment has been paralleled with a number of research initiatives to evaluate the effectiveness of practitioner use of interactive whiteboards in raising attainment and transforming learning (Becta 2003, 2004; ImpaCT2, 2002; Review Project, 2004).

MirandaNet, a collaborative online community of teachers, teacher educators, researchers and industry partners, has been involved in the evaluation of interactive whiteboard technology and use for the past five years. It has involved teachers, schools and pupils in research into effective IWB use through its practitioner-led action research projects (Cuthell, 2002; 2003; 2004) published on the MirandaNet website.

This paper examines one series of such studies led and managed by MirandaNet, through the MirandaNet Academy, into the ways in which interactive whiteboards have been used as essential tools to develop and implement school teaching and learning policies. The schools range from Early Years (K – 2) through to Sixth Form (Grades 12 & 13) and cover the United Kingdom from the North East to the South Coast. Further, the impact on teaching and learning in each of these schools, and the ways in which Information and Communication Technology (ICT) diffusion and integration within the curriculum is enhanced, is described. The collaborative creation of innovative curriculum materials and the optimisation of the range of learning styles is outlined, together with differentiation of materials and presentation to facilitate an inclusive classroom. The use of IWB as a tool in Assessment for Learning is explored. Pupil and teacher attitudes and perspectives are evaluated. The impact of IWB pedagogies on the schools' Teaching and Learning policies will be outlined, together with an assessment of the changes in attitudes and attainment.

The context for this work is provided by an innovative Continuous Professional Development programme of action research (Work-Based Learning) that accredits teachers at Masters level for units of work that they complete. The MirandaNet Academy provides the collaborative online environment and Bath Spa University College provides the academic framework for the scheme within the UK. MirandaNet and Promethean offer similar schemes worldwide

through the Promethean Ambassadors programme. Current projects involve schools in the UK, the US, China, South Africa and Mexico.

Teaching and Learning Policies

During the past three years a number of schools in the United Kingdom have developed policies on teaching and learning that involve all curriculum areas. The focus of these policies is the involvement of the learner: teachers and their departments have worked to develop strategies to involve all learners, and to produce differentiated materials that support a range of learning styles and abilities.

The use of IWB means that teachers can develop teaching resources that are available across the school local area network (LAN) and that can easily be modified to reflect the learning needs of pupils. Collaborative work by teachers is enhanced: resources are developed more quickly; departments can consolidate materials for each curriculum segment and the teachers themselves are presented with a greater range of pedagogical possibilities than they would otherwise have developed individually.

Whilst it is tempting to react to what may be considered the imposition of a certain uniformity in teaching styles – many teachers hold an idealised Hollywood image of the teacher as a charismatic individual changing people's lives – the reality is that the availability of such a wide range of resources in fact sets teachers free to interact with learners. Formulaic though it may be, the ability to pull up a list of learning aims at the beginning of each lesson, identify them in the plenary section of the lesson to consolidate elements for the learner and then use these as the start of the following lesson provides a structure to which many of the learners can relate.

When these are made available in the learners' section of the school LAN learners are placed in control of their own learning. They can revise previous lessons, catch up on work they have missed and place their learning in an overall curriculum context. The concept of school teaching and learning policies is one of rights and responsibilities, and schooling is thus placed in a context that emphasises social responsibility for one's own, and others', learning, as well as individual rights.

The impact of ACTIVboards on teaching and learning

There has been considerable debate in the United Kingdom over the importance of 'interactive' in the phrase 'interactive whiteboards'. Some would hold that the key determinant is the use of the board itself by pupils – their ability to respond to the materials presented on the board in an active fashion. By these criteria interactivity is judged by the number of times pupils come to the board and interact with it. Whether this is real interactivity is a moot point because, much as pupils enjoy the opportunity to leave their desk and activate the board, the reality is that when this happens it is under the control of the teacher.

Maybe the key factor is interactivity with the process of the lesson. In this reading what is important is the intellectual and emotional engagement of the learner. One can observe an apparently traditional classroom, in which desks are laid out in rows and face the IWB and teacher at the front of the room, and see that learners are engaged in learning that is communally constructed (Holmes et al, 2001). The teacher is a central part of this process, but the questions and responses of the learners provide the interactivity with the learning materials. The boards provide the focus for visualisation; the pedagogical software (in this case ACTIVstudio and flipcharts) provides the scaffolding and both teachers and learners are able to move between the different stages of learning.

The effects of IWB use on ICT diffusion

How can teachers maximise their use of Information and Communications Technology? That question is predicated on the assumption that resources and facilities are readily available to all teachers. Are ICT facilities available to all teachers at all times?

Many schools have adopted the policy of concentrating resources in computer suites: integrating ICT into lessons then becomes problematic. The facilities are 'owned' by someone other than the class teacher: the room has to be booked; the network is managed to minimise the unexpected; control of the machines is vested elsewhere – whether at district, school or departmental level – and the net result is to make ICT a discrete activity, rather than one that is woven into the fabric of teaching and learning.

Other schools have adopted a wireless policy, embedding a Wi-Fi network into the framework of the building and providing laptops for both staff and students. Whilst this approach can be liberating – computing power can be taken to wherever it is needed, whether in the laboratory, the sports field or the external environment – there are limitations in its use. Old buildings often have dead spots; at times of peak demand the network can prove less than reliable; re-charging laptop batteries requires careful management. Perhaps the most problematic issue is that of laptop ownership. Students often treat them as another consumer good; there are issues of security when connecting to the network; reliability is difficult to guarantee. (Cuthell & Preston, 2005)

Whatever solution is adopted by teachers and schools, however, the central issue is the integration into the lesson. Are the computers used for task completion? If they are, then what is the balance between learning and activity in the classroom? Are the computers used for learning? If so, what is the role of the teacher – and is learning an individual, or communal activity?

The use of an Interactive Whiteboard, on the other hand, provides a way in which the board becomes the focus of learning for the whole class, and the teacher is able to deploy all of the affordances of ICT to facilitate the learning of her students. The computer network becomes the repository of teaching and learning materials; the materials prepared by the teacher can be modified and updated; there is no reliance on old, paper-based worksheets and, most importantly of all, the teacher finds that her learning and that of the pupils comes together through the focus of ICT. ICT diffusion is therefore existential, a way of thinking, rather than the physical manifestation of an inventory.

Assessment for Learning

Teachers have always used assessment as a way of judging the success of their teaching and the pupils' learning. Conventional assessment methods, however, tend to be both labour and time intensive, which means that there is all too often a gap between the assessment of pupils and feedback to them. The use of systems such as ACTIVote with ACTIVboards, however, means that a range of assessment routines can be built into the structure of the lesson and immediate feedback provided to the learners. This provides teachers with the opportunity to engage in discussion with the learners about the effectiveness of their learning, and to observe the conceptual development of individuals. When learners are provided with feedback on their learning on a lesson-by-lesson basis their engagement with the learning process increases and interactivity becomes a key determinant of learner progress and success.

Continuing Professional Development initiatives

During the past year teachers have been engaged in a number of Masters'-level projects in which the impact of interactive whiteboards has been assessed. These projects have focused on developments in their schools as part of institutional teaching and learning policies or school improvement projects. The MirandaNet Academy has been working in collaboration with Bath Spa University College to develop opportunities for teachers who are working independently on research and development projects.

The MirandaNet Academy provides an online community of practice for educator collaboration, both across the United Kingdom and internationally. The discussion forum threads not only offer education professionals the opportunity to engage in collaborative discourse with like-minded peers, but also provide a reference resource for the whole community. Participants are able to upload their case studies and papers to an e-journal: peer review forms an essential part of the formative process of consolidating ideas and developing resources. For the growing community engaged in developing an effective pedagogy that uses IWB as a way of transforming teaching and learning in the classroom the MirandaNet Academy provides the virtual campus that meets the continuing professional development needs of the ACTIVboard action researchers.

International dimensions

The Promethean Ambassadors programme was set up in 2004 to involve educators, schools and universities in Brazil, China, Mexico, South Africa and the United Kingdom in an evidence-based research project to examine the impact of ACTIVboards, ACTIVslates and the ACTIVote system on teaching and learning. In all of these countries educators are working to introduce pedagogical approaches that can respond flexibly to the demands and needs of learners and a society increasingly dependent on knowledge and information industries.

A constant with any introduction of new technology is that of costs and benefits: do the costs incurred – financial, organisational, behavioural – create added value for all stakeholders? The key determinant is that of added value for the most important group of stakeholders, the learners. In conventional terms added value for them is seen as improved examination results.

The Ambassadors programme, therefore, places these issues in an international context that compares and contrasts specific cultural constraints and contexts, and will enable the impact of the technology to be assessed in an objective manner. The participants will have access to a dedicated online learning environment with discussion forums, resources, an online journal and a developing corpus of case studies. This site will have links to the Promethean World website and all its curriculum resources.

Those learners involved in the project with their teachers will use the safe online working environment of World Ecitizens for collaboration on curriculum projects with other learners across the globe.

The study will investigate the links between classroom technology and pupil achievement, and the impact of ACTIVboards – and all their affordances – on teaching and learning. The core user community of 24 expert practitioners, more than 300 learners and five countries will enable cross-cultural comparisons to be made on the effects of the technology on teacher praxis. Standardised research into attainment will provide significant evidence for administrators, whilst the publication of case studies should provide educators with classroom evidence and narratives that can develop best practice. The MirandaNet International Research Centre, based at Southampton University, will co-ordinate the project.

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