

Ambassadors for ACTIVlearning

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Abstract: This paper describes developments in the MirandaNet-Promethean Ambassadors project, a worldwide study to evaluate the impact of Promethean's interactive whiteboard technology on pupils' achievement and on the transformation of the learning experience in schools. The study involves schools, teachers and pupils in China, Mexico, South Africa and the United Kingdom. It began in January 2005 and is due to be completed in September 2007. The paper identifies trends and developments common to all of the countries and phases of education.

Referencing details: Cuthell, J. P. (2007) Ambassadors for ACTIVlearning. In Carlsen, R., McFerrin, K., Price, J. Weber, R., Willis, D. A. (Eds.), Proceedings of SITE 2007 (pp. 1443 – 1499) Norfolk, VA: Association for the Advancement of Computing in Education

Embedding ACTIVboards – interactive whiteboards – in pedagogical development

Since the introduction of interactive whiteboards in schools there has been considerable debate as to their impact on classroom interactions and pedagogy. Small-scale case studies (Smith, Higgins, Wall & Miller, 2005) have identified the ways in which, in the hands of innovative teachers, the technology can have a significant effect on specific aspects of teaching, learning or the curriculum (Davison & Pratt, 2003). What has been less clearly established, however, is the extent to which interactive whiteboards can have a long-term transformational effect on classrooms, colleagues and schools. Indeed, some ((Glover, Miller, Averis & Door, 2005)) have seen the technology as reifying traditional concepts of classroom organization and teacher authority. What this study shows is that teachers are empowered by the technology to effect changes in their pedagogy and classroom environment, and this has profound effects on pupil learning and behaviour. Key elements for wider dissemination are also identified.

Insights from the MirandaNet - Promethean Ambassadors ACTIVworld project

Since 1999 the MirandaNet Fellowship, (www.mirandanet.ac.uk) a not-for-profit organization involving teachers, teacher educators, government policy makers and technology companies, has investigated the impact of interactive whiteboards on teaching and learning. From 2002 a number of MirandaNet classroom projects focusing on these developments have been funded by Promethean, the manufacturer of ACTIVboards (Cuthell, 2006, 2006, 2004, 2003, 2002). The current MirandaNet-Promethean Ambassadors project began in 2005, and is due to be completed in 2007. This longitudinal research project involves countries in four continents – China, Mexico, South Africa and the United Kingdom – and more than 1,000 pupils, 100 teachers and 20 schools over a three-year period. The key teachers from the project have worked together, both face-to-face and online, shared their insights and strategies and fed these back to their colleagues. The focus of the research is on ways in which the technology has empowered teachers to extend and develop their pedagogy and transform their classrooms and the learning of their pupils.

Appropriate applications of new technologies

The history of education in the last quarter-century is littered with the debris of technologies that promised much, but failed to deliver in the classroom. In some cases the problems for which the technology appeared to be a solution resolved themselves (VCRs and televisions replaced film projectors for media aimed at the whole-class): in others, the learning curve for the technology was so steep that all but the most fervent advocates dropped off the slope (teaching pupils how to program). In many cases universal solutions proved prohibitively expensive (a computer network in every classroom).

Using a new technology

IT changes the way that we do things

It is a truism to say that our lives have been changed by technology, but at the individual level the tools we use predicate a range of actions and behaviours (Wertsch, 1998). Such tools as pens, calculators, watches and cell phones all make possible a range of behaviours that previously did not exist. The impact on our society effected by

personal computing have led to changes in the ways that we work, communicate, shop and live – and these changes have become global.

IT changes the ways in which we talk about what we do

When I was at school, and was allowed to move from using a pencil to using a pen to write, there was fierce competition to be the one who was allowed to fill the inkwells from the large bottle of ink, or to supply new nibs to replace those that had been broken by their use as weapons. To be presented with a watch marked a similar rite of passage – a significant birthday (or retirement): to make a phone call when away from home became a major undertaking. Our conversations about these things reflected the ways in which we used them.

IT changes the ways in which we think about what we do

As each new technology enters our lives, so we are able to think about doing things in a different way. As these technologies become more ubiquitous, so we are able to think about new ways of doing things – and each new way of doing predicates another new way.

IT helps to build new concepts

As we change the ways in which we think about what we do, so our concepts change. And, as our concepts change, new possibilities develop.

Adapted from: Winograd, T. & Flores, F. (1986)

But teaching is also a technology

It is a set of concepts

The concepts that we adopt as teachers develop from a number of sources: our memories of teachers, and the ‘teacher images’ that we carry round with us; the concepts transmitted through the teacher education process, and those that we acquire in the institutions in which we work.

It is a body of knowledge

Teaching as a technology is a body of knowledge in which is embedded subject knowledge, pedagogical knowledge, organizational knowledge and management knowledge. It is often difficult to disentangle these skeins: the longer one teaches, the more inseparable they become.

It is a set of behaviours and procedures

The knowledge and the concepts ensure that teachers are able to perform in the classroom context, teach the pupils and manage the classroom and administrative processes. The more successful these behaviours and procedures, the more deeply embedded they become, and they are therefore perceived as ‘successful’.

This is what I do.

This is how I do it.

This is how it works.

And the issue is combining these two technologies

How can the affordances of new information and communication technology combine with the pedagogical practice of teachers to create a new dynamic for 21st Century learning? The central issue would seem to be the ease with which teachers can accommodate technology with their praxis as teachers. Where the technology effects an initial match with what teachers do, how they do it and how they perceive it to work then the rate of adoption of that technology is more likely to be seamless than otherwise – although the underlying determinant is, as ever, its reliability.

New pedagogical technologies add to what we do

They can extend what we do, by increasing the number and range of inputs that we use as teachers, and ensuring that we can be more effective – by replacing handwritten text on a conventional whiteboard with clear print, for example, and increasing its size so that all pupils can read it.

They can help us to do the same things, but in different ways, by incorporating images and sound into materials presented in the course of teaching.

They can give us additional strategies for achieving what we want to do, for example, by enabling text, images and parts of problems to be moved around the board, or revealing specific parts of the board using interactive whiteboard tools.

All these are achieved by integrating the affordances of new technologies with our existing technology of teaching.

The impact of ICT

Information and Communication Technology, in and of itself, is transformative. It changes the ways in which we do things, and the relationships between people who use it. It changes expectations of the ways in which

we work. ICT can be seen as empowering the individual: learning can become more personalized; feedback, whether from the program or the system, is objective. ICT introduces a new learning dynamic

But

The ecology of the classroom changes

Traditional relationships between teacher and pupils are subverted when ICT is introduced. The focus for pupils becomes the screen, rather than the teacher. Feedback from programs via the screen becomes individual, rather than collective: pupils require individual feedback and help from the teacher, and the teacher can find herself relegated to the role of technology troubleshooter, so that the focus on the progress of learning – the prime role of the teacher – can be lost.

ICT can be considered a disruptive technology

It is difficult to effect a seamless integration of ICT with traditional pedagogies. In this sense it is disruptive: the old ways of doing things are no longer in control. Pupil expectations change, and the clash between what pupils know, of the possibilities that ICT holds out for them in the everyday lives outside the classroom walls, places an ever-increasing strain on the expectations of the school and its staff, in an age where prescriptive curricula measure success by group progression and conformity.

What is different about ACTIVboards?

When an interactive whiteboard becomes the focus for an ICT-rich teaching and learning environment the expectations of teachers and pupils change once again. The learning experience becomes shared and collaborative, rather than individual and fragmented, and the expertise of the teachers becomes, once again, focused on pedagogical techniques to contribute to the learning experiences of all in the class. The whole class or group shares the experience; the learning becomes collaborative; the technology is inclusive, rather than disruptive and the affordances of the technology enhance learning.

So what's new?

An IWB replaces a traditional board that the teacher uses – so that shift is comparatively seamless. The content is re-usable, which means a reduction in workload, after the initial content has been created. Multimedia can be integrated in the lesson, which marks a real transformation in the organisation of both materials and the classroom. No longer do pupils have to move to a dedicated resource space when the teacher wants them to view a video, or specialist equipment wheeled into the classroom. The integration of multimedia clips is seamlessly embedded in the lesson materials. And now the teaching works in a different way: explanations are no longer reliant on text and verbal discourse, and pupil learning is enhanced and expanded.

Enhancing and extending teaching

The first impact of an interactive whiteboard is to enhance and extend the existing pedagogical expertise of the teacher. In one of the project schools this was noticed at an early stage in the project, in an English class in China. The class was in a secondary school where the average class contained 50 pupils. In such a context interactive language teaching is difficult, allowing little scope in the course of the lesson for individual interaction. The challenge, therefore, was involving the whole class in the lesson.

The ACTIVboard changes the teaching process. The lesson that was observed dealt with topic sentences: text was broken into sentences, and these were jumbled. The class worked in small groups to decide how the paragraph should be re-structured, and the sentences were then moved into the correct position. Re-arrangements enabled discussion about shifts in meaning when the sequence was changed. The structure of the lesson was one that had been used for a number of years: what was new was that, instead of each pupil working through textbook examples and writing the answers on paper, the whole class was involved in the discussion. The affordances of the interactive whiteboard made this possible. A conventional whiteboard would have been wiped clean and the sentences re-written, or numbers allocated to each one. In either case the sense of the whole text would have been lost.

Enhancing and extending teaching: changing the process

The range of differentiated materials has encouraged all the schools in the project to experiment with changing classroom layouts that support group work. Instead of the whole class sitting in rows facing the ACTIVboard pupils work in groups differentiated either by topic or ability, and each of these groups can access the ACTIVboard to practice work, solve problems and present their findings to the rest of the class. Reports from the project teachers indicate that working with the IWB acted as a catalyst. As soon as changes in teaching and learning manifested themselves, teachers felt empowered to make more changes, knowing that the process would work.

Enhancing and extending teaching and learning

Within the first year of the project the teachers had developed banks of materials to support differentiation and extend their range of pedagogic strategies. All reported that they felt more in control of the classroom process. All reported improved motivation, punctuality, attendance and involvement on the part of their pupils.

And do teachers build new concepts?

What has been described is the first stage of pedagogical change, which has been observed in all of the project countries and schools. As the teachers use the boards with more confidence and competence they become more embedded in their praxis, and this frees them to innovate with the teaching styles they deploy. In this first stage, then, when teachers work in their classrooms in isolation from their colleagues their existing concepts are developed and reinforced by the new technology. Praxis - the integration of theory with classroom performance (Kolb, 1984) develops through reflective practice. Reflective practice is best supported through collaborative work, and this can be seen as the second stage through which the teachers involved in the project have moved quickly.

Starting to build new concepts

In two secondary schools in Beijing, No 14 and No 50, feedback from teachers after two terms' use of the boards showed changing perceptions of what constituted effective teaching, and there was a shift from traditional teaching techniques. There was strong realization of the impact of the boards on pupil learning. What had happened, therefore, was that the teachers found their existing teaching strategies enhanced and extended, and new concepts were beginning to form.

Supporting reflective practice

In all of the schools teachers moved quickly into the second stage of pedagogic change, with the realization that teams of teachers working collaboratively can form a community of practice, support one another and contribute to the overall development of the learning environment of the school. When teachers begin to collaborate the initial developments are often in terms of skills and content, which leads to better coverage of curriculum elements and more effective teaching strategies. This improved confidence and competence with the boards then leads to pedagogical changes.

Collaborative work

An interesting example of this second stage of impact can be read in this feedback from a class teacher.

*I enjoy preparing the lessons and although it was very time consuming I gradually learnt my way around the resource file and how to set things out. Working with my colleague ... we looked at the lessons and she gave me invaluable advice:
I had too much on one flipchart,
print size was too small
some lessons were still talk and chalk
she then showed me how to adapt them and make them child friendly.
(Primary school teacher, South Africa)*

There is a clear shift here from simply considering the technical aspects of the technology to considering the ways in which her own pedagogy had to change – ‘... some lessons were still talk and chalk ...’.

Pedagogical changes (1)

More active learning involving the whole class

The first stage of pedagogical change, then, sees whole-class teaching, but with a focus on much more learning involving the whole class. The use of multimedia brings a new dimension to the conventional lesson, which is further supported by visual materials. This is much greater scope for differentiated materials, and the integration of ludic elements (games, puzzles, interactive problems, working against the clock, word completion and reveal techniques, for example) promotes the enjoyment of learning. A consistent feedback from the pupils is that learning is ‘fun’. The fundamental shift in this first pedagogical change, however, is that learning is reinforced by the process of visualisation. We can see the boards extending the teacher’s role: the whole-class use, however, carries through from traditional pedagogy.

Pedagogical changes (2)

Support for group activities

The second stage of pedagogical change carries through from the first, and in the primary schools that formed part of the Promethean Ambassadors project occurred quite quickly. It was almost as if the installation of the electronic board in the classroom empowered the teachers to determine how the rest of the layout would change. The

changes in the physical layout of the classroom, combined with the increasing awareness of the teachers, led to pedagogical shifts. Differentiation of activities was enabled by the ACTIVboard whilst other groups worked independently. At the same time there was much greater scope for reinforcement and learning support. In turn, collaboration with colleagues produced a wider range of activities, which again supported the activities in the classroom. All pupils came to be seen as productively engaged in learning.

Pedagogical changes (3)

The third pedagogical change, observed in all schools, all phases and all countries, was that pupils began to clamour to present their own work on the boards. Pupils learned to work autonomously, either as individuals or as groups. A third element, therefore, is added to the teacher - pupil dyad. The teacher - IWB - learner triad objectifies learning, because the board and the materials become the focus of learning. Collaboration between pupils is supported, and network access to learning materials and flipcharts facilitates the learner involvement, particularly if these can be accessed by the pupil from home.

These changes, when pupils learn to work autonomously, is noted by a teacher in a Mexican primary school.

I now see a change in my students. I see them becoming more responsible individuals for their actions, individuals ready to act to make the world more equitable, individuals interested in working on a computer and the acquisition of a second language.

They are interested in being able to communicate with you. They're no longer satisfied that I am the bridge between the groups.

They are individuals who want to know other forms of life, customs of other groups, and who hold in high regard the name of their school and their country.

(Ing. Leopoldo Naranjo Elementary School Nuevo Leon, México)

Pedagogical changes (4)

The final, and most significant, shift occurs when pupils present their work to others. They prepare work at home or at school, using a range of software tools. Many use ACTIVstudio: others use PowerPoint. At one stroke the role - and status - of pupils is transformed. Preparing work for, and presenting to, peers reinforces learning, and the group work extends individual confidence and competence. The ecology of the classroom has changed: the layout, the behaviour, the power relationships, the expectations and, most importantly, the outcomes. In each of the schools in each of the countries lessons have been observed in which the focus is the pupils taking responsibility for their own learning and for the presentation of that to their peers. At the end of the lesson the learning has become a collective experience, supported by the questions and answers from the rest of the class. One of the traditional roles of the teacher, that of Circus Ringmaster, has been replaced by that of creative choreographer.

Factors that impact on successful implementation (1)

The teachers and classes in the project have demonstrated excellent practice and inspiring developments. There have, however, been differences in the ways in which the technology and pedagogical changes have been embedded in the wider school community. In every case the individual teacher has successfully changed the process and outcomes of their personal pedagogy. In some schools these changes have been restricted to the individual's classroom:

*"My principal [head teacher] is not involved enough.
I think that she is more concerned with other school needs.
Now we have more students so our needs are more."*

Factors that impact on successful implementation (2)

In other schools the teachers' colleagues have become actively involved in the collaborative work, sharing expertise, materials, ideas and resources. In these schools there has been a wider impact, on a number of classrooms. However, there has not been a transition to a shift in teaching and learning strategies across the whole of the school.

*"My colleagues are interested.
They would like to have an ACTIVboard in their classrooms. They consider it as an important new technology to learn.
They see it as critical for '21st Century learning'."*

Factors that impact on successful implementation (3)

The schools that have shown the most effective implementation of ACTIVboards to effect a whole-school change in teaching and learning are those in which the leadership has seized the opportunities to transform the learning experiences and life chances of all the pupils and their teachers.

“I am lucky. I have a head teacher who is always ready to cooperate, to renew ideas and to use different learning techniques.

These contribute to the development of the students.

In turn, the students, are and will continue to be, our main motivation for improving and facing the challenges that appear day after day.”

Interim findings: from China, Mexico, South Africa and the United Kingdom

Classrooms have changed. Pupils work in small groups, and teachers use the ACTIVboards across all of the subjects in the curriculum. In all of the project schools teachers report that there have been significant improvements in pupil understanding of, and attainment in, Mathematics.

- Data has been collected from more than 1.000 pupils and 100 teachers in four countries.
- Participant schools have been working with ACTIVboards for about eighteen months.
- All have seen increases in motivation of staff and students.
- Understanding and implementation of elearning have been increased.
- Pupil attendance, motivation and work have shown improvement.
- The feedback from school managers and teachers is that ACTIVboards offer a cost-effective solution for implementing elearning.

Government policy-makers, head teachers and journalists in China, Mexico and South Africa say that:

- ACTIVboards are an ideal vehicle for implementing elearning;
- transforming teaching;
- promoting active learning in the classroom.

Re-kindling enthusiasm: promoting creativity

Feedback from teachers (and their colleagues) in the MirandaNet-Promethean Ambassadors project indicates that in each country, teachers feel empowered by the boards and the software. They report that ACTIVstudio gives them back creativity, and that the banks of materials at their fingertips mean that they can respond to their pupils' every learning need. Their response is that their teaching is made more individual.

Empowering pupils

There has been an overwhelmingly positive response from all of the pupils in the project schools, even after eighteen months, when the assumption might well be that the Hawthorne Effect (1955) would have worn off as pupils saw the use of ACTIVboards in their classroom as routine. This has not been the case.

Pupils say that there has been a significant change, both in the ways that they are taught and in the ways that they learn. All pupils report that they feel empowered and more involved in the process of learning. A significant response is that many pupils say that they can now understand Mathematics, and that it is fun. In terms of the ways in which learning takes place, pupils say that they can visualize the stages of the lesson, and of their own learning. The overwhelming feeling on the part of pupils in the study is that ACTIVboards have changed the way in which they learn.

Improving outcomes

Teachers have seen a significant impact on pupil work and attainment. They report that motivation has increased, and punctuality and attendance has improved. Within the classroom, time on task is significantly better: pupils complete more work each lesson. The teachers have been surprised to discover that pupils regard ACTIVboards as essential to their learning.

Promoting elearning

Head teachers say that ACTIVboards are catalysts for implementing elearning and improving staff ICT skills, and that they are crucial tools for Continuous Professional Development and promoting school improvement. Many school administrators report that ACTIVboards are a more cost-effective way of putting ICT at the heart of the curriculum than trying to install suites of computers. When teachers link their ACTIVboards with their laptops they create a multimedia platform for ICT literacy.

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