ENHANCING MATHEMATICS TEACHING THROUGH NEW TECHNOLOGY
THE USE OF THE INTERACTIVE WHITEBOARD

ADVICE FOR TEACHERS OF MATHEMATICS

http://www.keele.ac.uk/depts/ed/iaw/

In the beginning it helps if:

- you get some initial training on how to switch it on, load software and write on it

- you buy some ready-made interactive whiteboard designed software – since it takes time to prepare all your own, and this should give you ready-made lessons as well as ideas of what can be done (see later for recommended software)

- you find out about training opportunities, especially about how to adapt your teaching to make your lessons interactive

- you talk to colleagues about sharing materials so that you don't all develop the same things

- you are aware that the more you use the board, the easier things become

- you use it and tell pupils you will learn with them, making sure that you let pupils come to the board and write on it so that they learn to use it

- you don't worry too much about making technical mistakes, the pupils can usually help you

- you consider the use of the Internet (if connected)

When planning lessons it helps if:

- they have clear aims and learning objectives and you think about how the use of the interactive whiteboard might enhance your teaching and pupils' learning

- you plan to allow for a variety of learning styles by incorporating colour and movement making use of 'drag and drop', 'hide and reveal', 'immediate feedback', 'overwriting' and 'step-by-step animation'

- you plan to make use of backgrounds available on the interactive whiteboard (different graph paper, squared paper, dotty paper)

- you plan to allow for more discussion, conjecture and pupil explanation

- you use the ready-made interactive whiteboard designed software you have bought (such as EXP Maths from Nelson Thornes, the Interactive Teaching Programs, from the DfES, and Interactive Mathematics from the Association of Teachers of Mathematics)

- you use other mathematics software (such as a graph plotter, geometry program, Logo, spreadsheet or wordprocessor), this depends on your expertise

- you expect pupils to draw, mark, predict, write and move things on the interactive whiteboard

When you first have the interactive whiteboard it helps if you find out how to:

- write on it, rub things out, go back (and forward) a step, move and change the size of objects and delete things

- open, close and save the interactive whiteboard specific software, often referred to as flipcharts or notebook files depending on your make of interactive whiteboard

- use it in the (usually) three different ways: with ready-made software; overwriting a piece of software or what's on the screen; and using the interactive whiteboard specific software

- use the ready-made interactive whiteboard designed software you have bought, reading the teacher notes, since these should offer advice on teaching strategies

- use other mathematics software on the interactive whiteboard

- use the camera or snapshot facilities available to copy on- screen objects

- use the keyboard from the interactive whiteboard and not the computer's keyboard

It helps if all lessons have clear aims and objectives and:

- are planned on a stepped basis to ensure development of objectives

- are developed to allow for a variety of learning styles

- incorporate different approaches planned to reinforce conceptual understanding

- include meaningful interactive activities that will help improve pupils' understanding of mathematical ideas

- have informal and formal assessment integrated in the lesson

- allow for the frequent review of learning that would include going back to earlier screens from the lesson

- begin with a starter to ensure immediate involvement

- include a main section where you can explore ideas, expect conjecture, allow for discussion, provide examples and develop practice to further understanding

- finish with and a plenary section drawing ideas together and offering some form of cognitive review

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Recommended interactive whiteboard specific designed mathematics software

EXP Maths 7 and 8 from Nelson Thornes
http://www.nelsonthornes.com/secondary/maths/marketing/books_exp.htm

Interactive Teaching Programs (ITPs) from the DfES
http://www.standards.dfes.gov.uk/numeracy/publications/#Interactive%20teaching%20programs

Interactive Mathematics from the Association of Teachers of Mathematics
http://www.atm.org.uk/buyonline/products/software/sof065.html

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The enhanced interactive mathematics teacher

It usually takes time to become an effective teacher using the interactive whiteboard and this should be recognised. Our evidence suggests that effective teachers usually start with a combination of commercial / professional and their own approaches in the development of their use of the interactive whiteboard.

We believe that teachers will be more effective if:

- there is a recognition that there will be progression in the development of ones' pedagogic and technological skills to maximise the advantages of using the interactive whiteboard

- consideration is given to appropriate CPD in terms of pedagogic as well as technological skills

- the purchase of materials that are designed to be used interactively on an interactive whiteboard is taken into account as the interactive whiteboard is purchased

- plans are made early on to integrate gradually the use of a wide variety of generic mathematics software (geometry package, graph plotter and spreadsheet) into lessons

- materials are designed so that they incorporate interactive features such as drag and drop, hide and reveal, immediate feedback, movement and animation, and allow for high-lighting and over-writing

- the classroom layout allows good visibility of and easy access by pupils to the interactive whiteboard

- other media are integrated into the lesson – to include associated worksheets (especially if linked to the work on the screens), textbooks and other source material

- pupils are encouraged to explain things to each other and the class, using the interactive nature of well-designed interactive whiteboard materials

- assessment processes are adapted - typically a more interactive style means that understanding is checked more frequently, so pupils will write less in books

- opportunities are taken to print off material from the interactive whiteboard screens

Health and safety issues* (taken from site noted)

It's important to be aware of the health and safety implications of using projection equipment such as IAWs in the classroom, particularly if children might stand in front of the beam to give presentations to the rest of the class. All projectors, if misused, have the potential to cause eye injury; so some simple guidelines should be followed:

- Make clear to all users that no one should stare directly into the beam of the projector.

- When entering the beam, users should not look towards the audience for more than a few seconds.

- Encourage users to keep their backs to the projector beam when standing in it

- Children should be supervised at all times when a projector is being used.

Enhanced pace and active pupil involvement are usually achieved through:

- the use of a variety of techniques so that ideas are underpinned by reinforcement in presentation

- the integration of visual stimuli such as colour and shading with movement to basic conceptual frameworks

- the involvement of pupils in an active way either through response to interactive whiteboard stimuli, board completion activities undertaken by the pupils, or through the simultaneous use of pupil mini-whiteboards as an indicator of understanding

- the use of concepts as the framework for cognitive learning, usually in plenary activity towards the end of the lesson

- the use of recalling earlier screens as a means of assessing, reinforcing and applying learning.

Classroom management

In **enhanced interactive lessons** the focus shifts from that of the conventional classroom through:

- directing attention to the interactive whiteboard rather than the teacher

- improved motivation as pupils see 'higher' quality materials especially when they involve pupil activity and immediate feedback

- the orchestration of pupil participation with the interactive whiteboard as the medium

- the facilitation of group, pair and individual activity with the board, not the teacher, as the mediator

- greater use of discussion, questioning, and requests for pupils to explain ideas, conjectures and reasoning

- enhanced pace because teachers are more aware of the timing and structure of their lessons

- maintaining pupils' interest by teachers' improved 'technical' skills

- the use of ready-made interactive whiteboard software and other mathematics software

- teacher awareness of techniques for stimulating learning and ensuring interactivity and the integration of these into lesson delivery as a means of maintaining attention

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Other recommended software

Geometry package
Cabri-Géomètre or Geometer's SketchPad.

Graph plotter	**Logo**
Autograph or Omnigraph.	MswLogo.

Presentation	**Spreadsheet**	**Word-processor**
e.g. PowerPoint.	e.g. Excel.	e.g. Word.