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**Geographical area where research is conducted:**  
South West

**Pupil Age Range:**  
Secondary

### **What were your original aims?**

Originally, I was interested in finding out about how the use of an Interactive Whiteboard can help develop the language used in Geometrical Reasoning. This is an area that in my experience is difficult to teach, and I was keen to explore the way in which the Interactive Whiteboard could change the classroom dynamics and help pupils to master the vocabulary they needed to express reasons for their answers.

### **In what ways did you refine your aims?**

Working with Sarah Fletcher from Bath University, I was able to focus in and target my Year 8 set two. These had average to above average Verbal scores from CAT data, were a group new to myself and had experienced no lessons on Geometrical Reasoning prior to the research date. There were two or three opportunities throughout the year to address this area of the syllabus, which allowed time for revision and reflection before asking further questions. I was keen to do the research as part of my normal teaching routine, and therefore the particular foci became the use of mathematical language in relation to parallel lines, transversals and geometric proof. These topics occurred naturally as part of the Year 8 syllabus.

### **Which research processes did you find helpful?**

At the start of the research period, I assessed prior knowledge using mini whiteboards and question-answer sessions. The use of a digital video recorder to document responses was an essential tool for reflecting on this at a later stage. The digital video recorder was used to document the whole of the research period in the classroom.

Other research processes I found helpful were:

- Talking with my mentor about the action-research process.
- Reading around the subject of action research (Jack Whitehead, Jean McNiff et al).
- Reading around the subject of Teaching and Learning Geometry 11 - 19, particularly The Royal Society / Joint Mathematical Council report 2001.
- Sharing a learning experience with my pupils
- Creating transcripts of particularly interesting pieces of lessons as evidence.
- Listening to feedback from pupils and using it to take the research forward.
- Using the interactive whiteboard in a creative way to help to further pupils' understanding of the subject.
- Feeding back to colleagues and getting their views on the progress and effectiveness of the research.
- Attending the TSM (Technology for Secondary Mathematics) conference in July 2004 in order to learn more about Cabri and how to set up tools for classroom use in a wider context than just Geometrical reasoning.

### **Which research processes did your pupils find helpful?**

The pupils responded in a very mature and positive way to the research, and gained from the process in a variety of ways:

- Working positively in groups, and being able to reflect on what they had actually learned.
- Talking to peers, often using unfamiliar language and presenting results to the class

- The use of the Interactive Whiteboard to play back parts of the digital video recordings was a very powerful tool both as a revision aid and as a vehicle for reflection on their learning.
- The use of Cabri as a dynamic tool to demonstrate proofs, particularly relating to that of 'the angles in any triangle add up to  $180^\circ$ '.
- The use of Cabri for naming particular angles without ambiguity.

### **What were the learning points you gained from undertaking the research and what were your findings?**

By doing this research, I have learned an enormous amount about how to use the Interactive whiteboard effectively within the Maths classroom. Cabri is an interactive Maths package that allows the user to change conditions on screen so that feedback is instant. In the classroom this means that pupils can make conjectures and test them thus enabling them to refine ideas without having to go through the process of drawing from scratch. Similarly, Autograph has a dynamic element, a very powerful tool for graphs and transformation geometry. I was able to use these two packages to formulate whole class conjectures and to test and refine them. My involvement with what were initially a few specialised programs such as these led to a whole host of other potential applications, and by being able to attend the TSM conference I was able to capitalise on the expertise of leaders in the field of ICT in Mathematics. I now feel confident enough to not only use, but to write applications for the classroom using Excel, Word, Autograph and Cabri. From a small question of how to improve the use of mathematical language for geometrical reasoning grew a much wider network of questions about the use of the Interactive Whiteboard as a teaching and learning tool within the context of a Visual Arts College. The use of the Whiteboard within the Year 8 class stimulated discussion and acted as a very powerful visual aid in the teaching of Geometrical reasoning.

### **What evidence relates to this learning and your findings?**

It is evident from a more confident approach towards the use of the Interactive Whiteboard, and from the sharing of good practice amongst my colleagues within the department. I have applied some of the new skills in ICT across all of my classes and I am in the process of writing activities into the schemes of work in Key Stages 3 and 4.

Others have taken on my approach to the use of the whiteboard after discussing ideas, and colleagues are more confident in the use of the Interactive Whiteboard as a teaching aid. More whiteboards are being bought for the department, and the aim is to get all eight teaching rooms equipped with whiteboards within the next eighteen months. The number of Interactive Whiteboards is currently 5.

During the research period I documented classroom discussion using a digital video and also collected evidence in the form of worksheets completed by my pupils. There is a clear progression in the confidence of pupils in their verbal and written contributions. I have retained the research group into Year 9, and they had remembered the names and types of angles during their revision session.

### **What are the questions for your future practice?**

- How can the Interactive Whiteboard be used in the sixth form to improve their mathematical understanding at A level?
- How can the internet be used effectively via the Interactive Whiteboard in order to improve teaching and learning within the Maths classroom?
- How can I help less confident colleagues to use the Interactive Whiteboard effectively and naturally as part of their teaching in Mathematics?
- What tailored classroom resource can I write using Cabri or Excel to help other Maths teachers in their delivery of the subject using the Interactive Whiteboard?

### **What are the questions for your school?**

- Is it worthwhile investing in an Interactive Whiteboard for each teaching room in the Mathematics department?
- If so, how will they ensure that all teachers use the whiteboards to their full potential within the context of a Visual Arts College?

- If not, how does the school ensure that pupils get a fair experience of the use of the Interactive Whiteboards available?

**Are there any questions for further research?**

- How can the Interactive Whiteboard be used in the sixth form to improve their mathematical understanding at A level?
- How can the internet be used effectively via the Interactive Whiteboard in order to improve teaching and learning within the Maths classroom?
- How can the Interactive Whiteboard be used more widely across the curriculum as a visual learning tool in the context of a Visual Arts College??

**How did you disseminate your findings with others eg within your school, other schools, LEA, wider?**

- Via curriculum team meetings
- Via the Numeracy Consultant for Wiltshire
- Via the Teacher Research website <http://www.teacherresearch.net/>