

## ICT – a modern solution to the science teaching equation?

**Jenny Turner:** Portland School, U.K.

Science teaching – Bunsen burners, test tubes, lab coats, and chemicals – I associated all of these with science and teaching but not computers. I was starting a teacher-training course for secondary science after having graduated with a chemistry degree some thirteen years earlier. My mind was full of questions and doubt – Would I remember any science? Would I be able to control a class of teenagers? Would I be able to control my nerves? The last thing on my mind was using the Internet to teach science.

Three months earlier, during the initial interview for a place on the Post Graduate Certificate of Education (PGCE) course, I had been asked the question ‘How would you use ICT in the science classroom?’ A bit of quick thinking and jargon, dragged from somewhere deep in the depths of my memory, saved the day, surprising myself and managing to fool the interviewer into thinking I knew what I was talking about. I resolved there and then to learn as much about computers and the Internet as I could during the summer months before starting the course. Of course, best laid plans and all that.....!

I began the PGCE course in October 2003 and it seemed as if every lecture that I attended seemed to incorporate some aspect of ICT and I began to think that maybe I should have done some of that summer revision after all!

Starting my first placement was an experience I had been looking forward to. The science labs in my teaching practice school had been recently refurbished and looked lovely. The science staff enjoyed showing me round and proudly displayed their new interactive whiteboards, laptops and large computer suite linked to the network. During the observation days at my new school I realised that each of my classes had been timetabled for one lesson per week in the newly refurbished computer suite. This added up to a lot of computer lessons! My knowledge of computers was limited to computer games that my sons played endlessly. I was a complete novice without even a basic working knowledge of computers. How did I switch the computers on? And what did all the symbols on the screen stand for? My questions began to give way to a sense of rising panic, which inevitably meant many, many long evenings in front of a computer screen trying to work out what everything was and how to use the machine. A lot of frustration and ‘trial and error’ was involved in these evening sessions and many documents were lost and programmes had to be re-installed as I battled to understand the complexities of this technology, but I slowly began to learn through my mistakes – the first lesson being the value of ‘backing up’ any material or documents that I may later need!

During this experimental stage of learning, I discovered an invaluable resource – The World Wide Web. It’s a huge place with enormous amounts of information available to all. The question was how to access this to best effect. Again, I became my own teacher and spent hours ‘browsing’ the web, familiarising myself with the different search engines and web browsers and I quickly learnt some basic rules for searching for information.

- Be specific – type in exact words rather than a vague topic heading e.g. type in ‘metals’ and the first few results are irrelevant if as a chemist you are looking for a description of different metal elements. ‘Metal sculpture’, ‘*metal testing*’ and ‘*heavy metal music*’ all have their place but just not in my science lessons. So typing in ‘*metal elements*’ proved much more fruitful leading me to the website [www.chemsoc.org](http://www.chemsoc.org) which provided all the information required and more!
- For a U.K. based teacher, select a UK search rather than a whole world search – this again reduces the amount of irrelevant information presented. E.g. typing in ‘*metal elements*’ as a whole world search led me to a metal jewellery website. However, with a UK search it led me, once again, to the [www.chemsoc.org](http://www.chemsoc.org) website.
- Check the spelling and do not include any punctuation. Typing in ‘metlas’ reveals nothing of any use (dependent upon the search engine, as some would return – did you mean ‘metals’?).
- And finally, the first page of results usually is the most relevant to the search! (Believe me, after trawling through several pages of worthless information I usually went back to the first result!)

I began to see the Internet as a tool for teaching science more effectively and not just as an ‘extra’ when lessons had been timetabled in the computer suite! My worry now was that, like my own children, having had computers accessible to them from a young age, these students would already be experts and more competent and familiar with using computers than I would be. It would either be embarrassing or could be a great opportunity to learn something from the pupils. I didn’t know which scared me most!

My first attempt at using the Internet as a research tool with a whole class went remarkably well. A year 10 class of students were learning about the Periodic Table and its elements. We had decided to ‘build’ a 3-D periodic table and display it along the back wall of the classroom. The aim was for each student to research one element and find out 6 facts about that element and make a cube displaying one fact on each side of the cube. I gave them the element to research and two websites that would provide them with the information required [www.chemicalelements.com](http://www.chemicalelements.com) and [www.webelements.com](http://www.webelements.com) and they then completed the seemingly simple task with enthusiasm.

As I became more confident in using the Internet myself and became more confident in my classroom management I decided to allow the pupils more freedom to experiment and become familiar with the process of using more than one website to gather information for themselves. A class of year 8 pupils studying the topic of ‘food and digestion’ used the project as a means of assessing their learning. The pupils were presented with a booklet in 4 sections containing questions to answer and tables that needed to be completed. By using the various websites provided for them in the document such as [www.bbc.co.uk/food](http://www.bbc.co.uk/food) and [www.learn.co.uk](http://www.learn.co.uk) and [www.kelloggs.co.uk](http://www.kelloggs.co.uk) they were able to research the information on different food groups and the nutrients that they contain and so answer the questions. The final part of the project was to use a publishing package such as Power Point or Publisher or Word to produce an individual balanced menu for one day using some of the information previously gathered.

One of the final projects that the students completed during my school placement allowed for even greater freedom. It was partly an exercise in using search engines and partly an exercise in the students gathering and collating information for themselves with the possibility of presenting that information to the class the following lesson. The students were set the challenge to find out about antagonistic muscles. I gave a brief explanation on how to use a search engine effectively and provided them with a couple of the most commonly used ones such as [www.google.co.uk](http://www.google.co.uk) and [www.yahoo.co.uk](http://www.yahoo.co.uk). Once the task had been explained clearly and everyone knew what was expected from him or her, I was able to monitor progress, offering advice when necessary. It quickly emerged that the biggest problem was how to best consolidate and comprehensively condense the sites that resulted from the searches in order for the students to make sense of them all and not be overwhelmed with all the information that was available. It reinforced the fact that the first page of results is usually the best. Using the Google search engine and typing in 'antagonistic muscles' yielded many sites the following 3 of particular note: [www.longleypublications.co.uk](http://www.longleypublications.co.uk) and [www.helicon.co.uk](http://www.helicon.co.uk) and the ever useful [www.bbc.co.uk/schools/gcsebitesize](http://www.bbc.co.uk/schools/gcsebitesize). Many pupils also accessed the images section of the Google search engine and were able to download pictures to go with their notes.

I found many positive reasons for using the Internet in teaching within the classroom. Pupils who were involved in using the Internet were motivated to complete the tasks, they turned up early to each lesson, were in a hurry to start the lesson and behaviour was not a problem because all students were on task.

However, I found that certain factors had to be considered when the teaching took place in a computer room:

- The way that the ICT suite is set up varies considerably from one school to another. Generally the classroom dynamics change considerably and the noise level occasionally increases slightly; this requires extra vigilance and patience from me as the teacher.
- I occasionally found myself in a position where the pupils knew more than I did about the hardware and the logistics of the system being used. However, I began to use this as an opportunity to increase my knowledge and the self-esteem of pupils increased as they realised that they could teach me.
- Tasks had to be relevant and pupils well prepared for their tasks before being given assignments which meant a lot of forethought and preparation by me, the teacher.
- Pupils still needed a lot of teacher input and intervention throughout the lesson reminding them of the purpose of the lesson, offering advice where necessary and to draw the lesson to a close to discuss the achievements at the end of the time.

As well as setting research projects I was able to download many pictures, images and illustrations from the Internet and combine these into individual lessons to reinforce a particular point or to illustrate certain aspects that I could not have done justice to. To this end the following book became my Bible - The Usborne Internet-linked Science Encyclopaedia. It covered a whole range of topics from chemistry, physics and biology through to earth science and genetic engineering and contained

descriptions and links to web sites that provided illustrations and diagrams making the subject matter fun as well as informative. Many of the images contained in the book could be downloaded for free from the Usborne site and became the basis for many games and card sorts that I created and carried out in the classroom.

E.g. downloaded pictures of the 4 different types of adult teeth from the encyclopaedia by typing in [www.usbornequicklinks.com](http://www.usbornequicklinks.com) and followed the instructions to get to the correct page online. After downloading and saving these images to my computer I was able to manipulate them. I enlarged them, added the appropriate name of each tooth, along with a description of the function of the tooth. I was then able to print this out on to card, cut them into smaller, individual cards and put one of each into an envelope. I wrote the instructions for the game on the front of the envelope and the pupils could then rearrange and match up the name, picture and function of the teeth – a good starter game revisiting work previously learnt in earlier lessons. This entailed a lot of work the first time but the resources can be used and re-used again and again and using the pictures from the site rather than hand drawing them meant that the game had a professional look.

I was also able to download many images from other websites that I found during my 'browsing' sessions, including many suitable for Key Stage 3 pupils (in the U.K. these are between the ages of 11 and 14). Ones that I found extremely useful included [www.kidshealth.org](http://www.kidshealth.org) and [www.chem4kids.com](http://www.chem4kids.com) and [www.enchantedlearning.com](http://www.enchantedlearning.com) .

The availability and ease of access to the Internet enables both pupils and teachers to access an enormous range of resources and information never previously possible and traditional approaches to teaching, where teachers often taught pupils in a didactic fashion have to be challenged and reviewed in the light of what technology can now offer. Many pupils now have the opportunity to achieve, where once they failed, through the use of ICT, however, this does not mean it should be used in every circumstance. ICT should only be used where its use can be justified as a method of achieving the learning outcome for any particular lesson and where it enhances the learning.

I began Initial Teacher Training in September with little experience at using ICT either in or out of the classroom. Now, at the end of the course I feel competent and able to use ICT whenever the opportunity presents itself. I enjoy using ICT and am eager to take advantage of any opportunity that presents itself to expand both my knowledge and experience during my years of teaching. I have, in learning how to teach others, found a renewed enthusiasm for learning.

**Jenny Turner** graduated with a B Sc in chemistry in 1991 from Hull University. She initially worked as a teaching assistant with children who had special behavioural and educational needs before re-training at Loughborough University in 2003/2004 as a secondary science teacher. She is now in her first year of teaching science.