When Did You Last See a Computer in the Science Laboratory? Do Something!

John Widmer

I first started using a computer as a science teacher in 1982. I remember that class clearly. The computer pushed out my first worksheet. I won't discuss the pedagogy of giving students pieces of paper here. I was just proud that I had produced a piece of work that was neat. My handwriting was terrible and my blackboard work was even worse. I felt that I could never be a real teacher. Now I had some way of trumping my colleague with his neat, multi-coloured blackboards. I was hooked. I was going to use a computer in my classroom.

Just this year I returned to science teaching. I had not been in a science classroom for ten years and I decided to take a look. The blackboards were still there. The multicoloured diagram of the biconvex lens had not changed. Between the physics and chemistry class-rooms, I found the slowest Windows 95 computer. What could I do now?

I had previously recommended to one of my science teaching colleagues that we buy the Tain Electronics interfaces www.tain.com.au/. It was still there. *These interfaces allow students to run experiments that are too slow to see in one class or too fast to catch by eye*. You can also use them to replace the thermometer with a temperature sensor. I don't think it matters much. I just wanted to use a computer in class. *Students should see a computer doing some work*. This is not the same as using a wordprocessor or a spreadsheet. When you use a data interface the computer is working for you. The computer was setup with an interface and some clearly labelled boxes containing sensors.

The Secret

I am a teacher of Dip. Ed. Computer Methods students, so I had the theory right. How did I get the classroom to work in practice? I tried a couple of approaches to using this computer. Some of them did not work. This is what worked for me this year.

- Wheel the computer in and ask one of the fastest students to plug it in. The students set it up. It is not a job for the teacher.
- Use an old Windows computer. Nobody else will.
- Set up two activities that each group of students can do over the whole term. When everybody is doing something else, a couple of students are off using the computer. Don't try and finish it in one week. Take time.
- Pick some activity that is appropriate. I used the Tain Electronics conductivity kit to measure the saltiness of the Maribyrnong River. Then I made up my own experiment using a light sensor and a torch. Everybody else was investigating light with conventional equipment.
- Connect the computer to the school network in some way. Use a radio connection if a wire connection is not available. This allows the student to save masses of data to their network folder for later analysis.

- Keep it simple. Just make sure it happens in almost every class. The activity will become as normal as 'writing on the blackboard'.

The Problems

I like meddling in other people's classrooms now. I work in six schools. I teach at the University. I sit on the ICTEV State Council. I am interested in policy. I am interested in change. I don't see many science teachers using computers in classrooms. At one of my schools

they have a science 'pod'. I am more likely to meet a student typing an English essay in that glass walled room. I might be wrong. I cannot quote the statistical data. I just don't think many teachers allow their students to use computers in a science classroom.

The Solutions

- Look at your colleagues and get some anecdotal evidence. When was the last time you saw a computer in their science class.
- Get some clear data. But use Karl Popper's approach http://plato.stanford.edu/entries/popper/. Prove me wrong. Don't come out with another rosy survey that proves we are all doing a great job.
- Survey the students. What ideas do they have for using computers in an open-ended investigation?
- Use a stronger approach if it is not happening. Write it into the curriculum with a specific activity that is assessed.
- Use a softer approach. Write an article like this one.
- Sort out your own motivation. When I was asked to talk to a meeting of teachers, I refused. I did not want to become the teacher expert who knew it all. I sent one of my Year 9 students. She did the workshop for me.
- Try anything. Just check to see if a computer is running in the classroom and that a student is using it.
- Don't ask students to type up pieces of paper and call them science projects. Set up a real science web and ask them to publish their science issues paper there. I did. http://intranet.footscray.vic.edu.au/science9
- Buy Australian software and computer interfaces if you can. They are cheaper. We owe it to ourselves to support local developers. I have been using Tain Electronics equipment for 15 years. I still use one of the original interfaces I bought in the 1980s.
- Use hand held devices like the Texas Instruments equipment. But use a computer as well, the screen is bigger and more students can see what is going on!
- Write to me if you have your own ideas. Communicate with colleagues.
- As that great footy coach said on another occasion 'DO SOMETHING'.
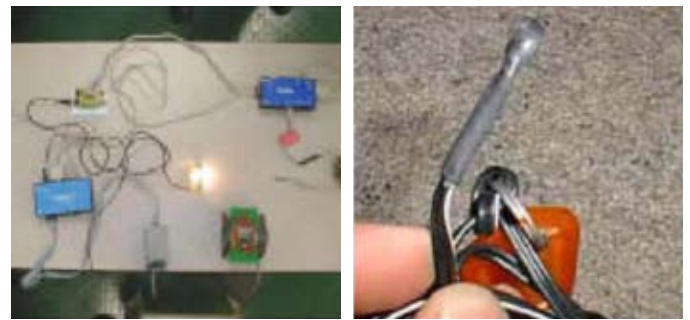
Interfaces

Interfaces are boxes that allow you to connect sensors to collect data from a baffling variety of sources. The interface should also allow you to control electrical switches. The interface is often connected to the serial port of the computer. USB port interfaces are increasingly common and do have some advantages with fewer power connections. USB port interfaces draw their power from the computer but don't work any more effectively than the older style of serial interface.

This tangle of wires uses an input interface with a light sensor. It also has a separate interface to control the movement of a 12 volt motor.

Sensors are often as cheap as the original analogue equipment. I use the temperature sensor constantly. You can certainly measure things that will allow you design your own experiments. Stop the students following the book. Allow them to make up their own investigation.

Have fun!

Resources

www.tain.com.au/

http://intranet.footscray.vic.edu.au/science9

http://ictev.mag-net.org.au/mrjohn/

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