



SSERC Bulletin

Number 226 Winter 2008

Ideas and Inspiration supporting Science & Technology for all Local Authorities

CPD News

Biology News

Pearl Swirl Fluid

Homopolar Motor

***Interfaces–
The next Generation***

***Metals–
Manufacturing
Processes***

Sign of the Times





Science CPD @ SSERC

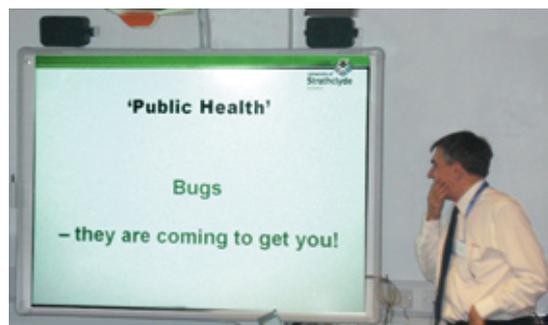
Following the success of the programme offered in 2007 – 2008, SSERC is once again running *Bridging the Gap* - a range of experiential courses to support implementation of *Curriculum for Excellence in the sciences*. At the time of writing, Part 1 of the Biology, Physics and Science courses have run. The course programmes include hands-on workshops, lectures, discussion activities and opportunities for delegates to share ideas and good practice. Physicists had opportunities

to hear *Heather the Weather* (Heather Reid – BBC Weather presenter and meteorologist), carry out activities such as *Pimp my Trolley* and learn about new and innovative *smart materials*. During the Biology course, delegates heard from Professor Iain Hunter on how *Bugs were coming to get them* and had fun investigating hygienic practices through the *Andrex Challenge*. One consequence of SSERC personnel trialling this particular practical work beforehand, was a dramatic increase in their use of soap! We do hope that pupils too will be able to apply the results of their investigations beyond the classroom! The Biology residential included a range of other participative activities suitable for use in the classroom and these will become available through the SSERC website and a new dedicated website which is under construction. A visit to *Science and Advice for Scottish Agriculture (SASA)* demonstrated superbly the relevance and application of science as delegates learned how classification, microbiology and DNA profiling, all topics explored during the residential course, are put into practice to monitor and protect our food supply.



Similar courses are being run for *Chemistry, Integrated Science* (to Level 4) and *Primary Science*. Two key features of all of these courses are that delegates receive a variety of resources for their schools, (value around £200) and that they are asked to undertake a *Gap Task*. This involves delegates carrying out an activity, in line with *CfE*, with their pupils back in their classrooms and sharing their experiences with other delegates in Part 2 of the course. This activity provided a wealth of tried and tested good ideas to take away from the course, in addition to those included in the programme.

Courses for secondary science make full use of the excellent new SSERC laboratories and meeting rooms, whilst Primary courses are taking place in Glasgow Science Centre. The cost for these two-part residentials, including all meals and accommodation, is £100.



This programme of science CPD also offers experiential courses for other groups key in providing good learning experiences in science for pupils. All PGDE students in Scotland have been invited to a two-day residential school, to be held in January 2009, whose aim is to provide the students with experiences not normally available within the constraints of the one-year course. A course is planned for *new and aspiring Heads of Faculty*. Another major aspect of the project is our work with technical support staff. In partnership with the *Scottish Technicians Advisory Group*, we are developing a series of units, pertinent to the work of school technicians which are levelled and credited through the *Scottish Credit and Qualifications Framework*. Training support is being made available for technicians across Scotland in association with a number of Local Authority Training Partnerships. Further updates about the programme for *CPD for Technical Support Staff* will appear in a future issue of the Bulletin.



New Personnel - Welcome!

Effecting this major programme of resource and professional development clearly requires personnel and SSERC is delighted to welcome a number of 'weel-kent' and 'nae-sae-weel-kent' faces into the team: Paul Beaumont (Senior Advisor, Science), Catherine Dunn (Development Officer, Physics), Michael Guile (Development Officer, Technological Studies), Stuart MacDonald (Development Officer, Chemistry), Teresa McErlean (Development Officer, Primary Science), Philomena Muggins (Project Officer, Technician CPD), Gerry Paterson (Technical Officer, Physics) and Tina Taylor (Technical Officer, Chemistry). We are all excited at the prospect of developing new, engaging resources for use in the classroom that support learning and understanding of science, and to taking forward effective and enjoyable CPD for teachers and technicians.



The Support for Science Education in Scotland through CPD programme is underpinned and supported by a number of organisations, with major funding being provided from the Scottish Government.



Photographs: lectures, laboratory activities and discussions at the Biology and Physics residentials.

From Bugs to Big Beasties and Other Queries- some answers to frequent and not-so-frequent questions in Biology

SSERC receives many enquiries as to which activities are permissible in a school within Health and Safety Guidelines. This article aims to highlight some of the common and not-so-common Biology related enquiries we have received over recent months.

To use or not to use?

The use of animal material in school can be of considerable educational value and a range of material is available and suitable for this purpose. In so using animal material, care should be exercised regarding the sensitivity of pupils towards its use.

Pupils should understand the educational objectives of using such material and be aware of the consequences of its use to the species involved and of its impact on the environment.

This is also an area where there are currently well-publicised, rather than necessarily well-understood, hazards. In a number of cases these dangers are theoretical rather than significant in terms of the actual, practical risks. In taking the necessary steps to control any risks and in explaining these clearly to pupils and students much additional educational value can be obtained.

To dissect or not to dissect?

A number of urban myths surrounding the dissection of animal material continue to 'float around'. These contribute to confusion and we receive enquiries about various aspects of dissection on a regular basis from both teachers and technicians. Many of these simply ask: 'What are we allowed to do?' Our answer is that dissection of animal material is permitted so long as it is obtained from animals that have been slaughtered for human consumption. Such material may be obtained from butchers and, on occasion, abattoirs. The dissection materials must be fresh or, if they have been frozen, recently defrosted.

A significant number of enquiries relate to the potential use of eyes and brains, with particular concerns over the possibility of their harbouring agents that cause spongiform encephalopathies (*e.g.* BSE). Again, organs from animals prepared for human consumption may be used for educational purposes. Such animals are deemed to be safe when slaughtered within the prescribed age limit of six months for cattle and twelve months for sheep and goats.

How to clean dissection instruments.....

Instruments used for dissection purposes should be cleaned thoroughly using hot water and detergent. It is also preferable to sterilise them by autoclaving before their next use. Where appropriate, the use of dissection scissors would be preferable to using surgical scalpels. The advantages of this are twofold: using scissors reduces the incidence of accidental cuts, and also takes away the need for disposal of used scalpel blades.

....and how to dispose of the animal remains?

In the absence of any specific, local arrangements for specialist collection and disposal, small quantities of waste from dissected animal materials should be double-bagged in opaque polythene bags, and disposed of via the local authority refuse collection and disposal system.

Are pupils allowed to sample their cheek cells?

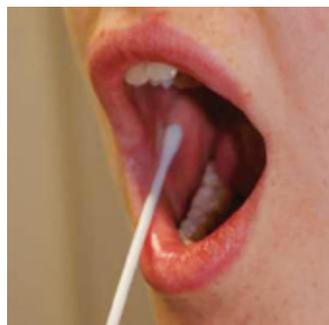


Figure 1 - Sampling cheek cells

Our answer to this is a resounding 'Yes'! What could be more fascinating than looking at your own body cells or extracting your own DNA? In our experience, such practical work both stimulates and engages pupils and has significant educational value. In carrying out this practical work, pupils do have to observe certain preventative and protective measures and the consideration of these, in itself, can have significant value.

In order to prevent any possibility of cross-infection, pupils should collect and prepare only their own cells. Once they have taken their samples (by rubbing the inside of their cheek with a cotton bud or similar – *see Figure 1*), pupils must immediately discard the transfer implement into disinfectant, either 1% chlorine bleach or Virkon™.

On completion of the activity, slides and coverslips must also be transferred to the disinfectant, where they should remain for at least 24 hours. Teachers or technicians can then remove these for thorough washing and re-use. Disinfected cotton buds should be placed in a polythene bag, sealed and disposed of through the local authority refuse disposal system.

...and use their own saliva?



Figure 2

Saliva was traditionally used to demonstrate the action of the enzyme salivary amylase, which converts starch to maltose (*Figure 2*). With the recognition that viruses can reside in body fluids, uncertainty arose as to whether the collection and use of saliva from pupils was permissible under Health and Safety legislation. Whilst alternatives to salivary amylase are commercially available as

liquid and powdered bacterial amylase these also have a number of disadvantages: they are more expensive; the use of powdered enzyme requires further preparation; and neither readily demonstrates a link with living organisms.

Saliva therefore has several advantages and it can be used to carry out interesting and valuable practical work so long as pupils observe the appropriate preventative measure by collecting and using only their own saliva. All apparatus in contact with saliva should be disinfected for at least 24 hours in either 1% bleach or Virkon™ and then thoroughly washed before re-use.



Figure 3

Can blood samples be taken from pupils?

SSERC personnel regularly receive enquiries as to whether it is permissible to take blood samples from pupils, with the purpose of testing blood glucose levels (Figure 3) or determining blood groups using Eldon cards.

The latest guidance from UK Government Departments outwith Scotland does not completely rule out the taking of human blood samples in schools and colleges, although it is not encouraged; it is for the employer to give approval. For such approval to be granted, a teacher must be able to justify the procedure on educational grounds and demonstrate that they can ensure safety at all times.

Safety here is heavily dependent on administrative controls (with all pupils following each instruction to the letter) and employers may be reluctant to grant approval. Under no circumstances should pupils be given this activity to carry out at home.

I have been told that I cannot take swabs from classroom surfaces in order to inoculate plates. Is this true?

Microbiology is another area that provides wonderful opportunities for practical work that engages and stimulates. Pupils keenly anticipate and are excited to see what has grown on plates they have inoculated from the swabs they have taken (Figure 4). Such work can provide very positive educational experiences and can be safely carried out provided that simple preventative and protective measures are observed. Common sense should be applied to selecting the 'test' area; for example, pupils should not swab areas such as toilets. Other common sense measures include: using the swab to inoculate only solid medium before being discarded into disinfectant; growing micro-organisms on solid medium within a petri dish so the operation is small scale and, by taping the dish¹ and not re-opening, the microorganisms are contained;

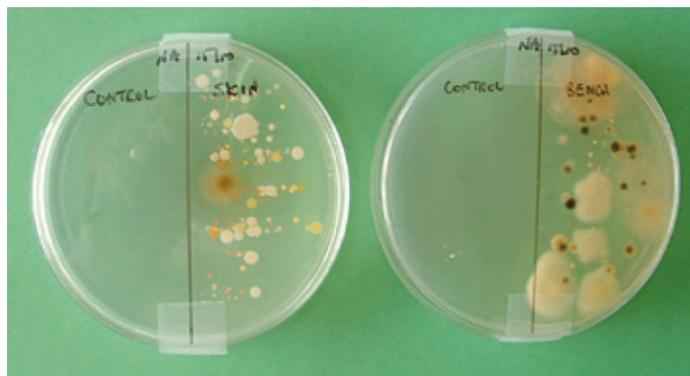


Figure 4

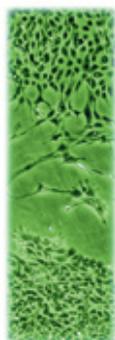
incubating at a temperature of no more than 30°C to discourage growth of pathogens. Finally, after examination, plates should be autoclaved before bagging and disposal with normal waste.

An Advanced Higher student would like to carry out a chemical analysis of dog urine. Is this allowed?

Sampling, analysis and use of **human** urine for educational applications is not routine at school level, but can be carried out at the post-16 level as part of project work. Such investigations should involve specific risk assessments being carried out and the work undertaken with appropriate supervision.

There does not appear to be any restriction on the use of animal urine for project work. However, major concerns here are how the urine would be sampled and also how it would then be stored for testing. Urine provides a good nutrient medium for bacterial growth, and so it would need to be stored at low temperatures for short periods of time and disposed of by flushing down the toilet, with all containers being sterilised afterwards. A full risk assessment of the activity would need to be carried out prior to the investigation. If the investigation were to be undertaken by a pupil in a medical/veterinary facility, the host institution would be responsible for carrying out the risk assessment and providing specialist supervision.

¹The petri dish should only be taped diametrically. If completely taped and sealed, this may encourage the growth of anaerobic bacteria.



Where can I find information on microbiological and other biological safety issues?

The advice provided in the foregoing article, and much more, is provided in two documents available on the SSERC website and on the SafetyNet CD to SSERC members. The documents are:

Materials of Living Origin: a code of practice for Scottish schools

http://www.sserc.org.uk/members/SafetyNet/Biology/MOLO/Main_Menu.HTM

Safety in Microbiology: a code of practice for Scottish schools and colleges

http://www.sserc.org.uk/members/SafetyNet/Microbio2/Main_Menu.HTM

Besides e-mailing or telephoning SSERC for help with these issues, the SSERC website (www.sserc.org.uk) contains lots of useful information as well as downloadable copies of the documents mentioned above.

The other 'must-have' publication containing advice on Health and Safety matters is:

Topics in Safety 3rd Edition, The Association for Science Education (2001).



Figure 1 - L'Oréal Elvive Nutri-Gloss Shampoo

Where is it used?

Pearlescent fluid is something that we have all seen in products that we buy everyday (*Figure 1*). It is added to shampoo, bubble bath and liquid soap to give them that luxurious, pearly iridescent look. Pearl Swirl™ fluid (PSW) is commercially available as a liquid concentrate pearly white suspension from Middlesex University Teaching Resources [1] and is an example of a *rheoscopic fluid*. It is non-flammable, unreactive and contains no toxic materials. See more on this on the Steve Spangler website in the US [2].

Rheoscopic?

Rheoscopic comes from two Greek words, *rheo* meaning *flow* and *scope* meaning *to watch* and the fluid can be used to demonstrate flow patterns in liquids.

How does it work and how can we use it in Science?

PSW is a suspension containing microscopic crystalline platelets. When PSW is in motion, the suspended platelets line up, with their larger dimensions parallel to the direction of flow of the moving liquid. On illumination, the moving platelets in different parts of the suspension reflect light in different directions, making the formation and movement of the currents visible. This is very useful for showing concepts which can be difficult to visualise such as ocean currents, aerodynamics, turbulence, convection and other motion effects. The solution can be kept and re-used. Here we have used it to demonstrate convection currents (*Figure 2*). Have a look at the movie on the online version of this SSERC Bulletin [3].



Figure 2 - As liquid is heated the pearlescent particles show convection currents

SUPPLIER

Middlesex University
Teaching Resources
Unit 10
The IO Centre
Lea Road
Waltham Cross
Herts EN9 1AS

Tel: 01992 716052
Fax: 01992 719474

Code : 314-012
Pearl Swirl Fluid
£7.99 ex vat

Equipment

Beaker, 600 cm³
Measuring cylinder,
500 cm³ tripod and wire gauze
Distilled water
Pearl swirl concentrate
Food colouring (optional)
Dropping pipette
Teaspoon, 5 cm³
Heat resistant mat
Bunsen burner

Method

Measure 450 cm³ distilled water into beaker.
Add 1 teaspoon, 5 cm³ of pearl swirl concentrate and stir to mix.
Add 1 or 2 drops food colouring if required.
Place the beaker on the tripod.
Set up a Bunsen such that the flame is just heating one edge of the beaker.
As the solution starts to warm up the suspension starts to flow (*Figure 2*). When the fluid on the side which is being heated by the Bunsen flame warms up you can see the direction of flow of the liquid in the beaker.

References

- [1] - <http://www.mutr.co.uk/index.php>
[2] - <http://www.stevespanglerscience.com/product/1218>
[3] - http://www.sserc.org.uk/members/SafetyNet/bulls/226/Pearl_Swirl.htm

We first came across this motor a few years ago and were recently reminded of how much we liked the design. As far as we can tell, it was developed by a group of Japanese physicists who call themselves the Stray Cats, though homopolar motors have been around since the time of Michael Faraday. The term comes from the Greek roots *homos* meaning same and *polos* meaning pivot or axis. Unlike a d.c motor with a commutator, the polarity is the same at all times.

To make it, you need (Figure 1) a ferromagnetic wood-screw, piece of thick copper wire, D -cell battery and a disk-shaped magnet with poles on its faces. A neodymium magnet is ideal, but we used a ceramic one wrapped in foil, as the disk must be a good electrical conductor.

Allow the woodscrew to stick to the magnet as shown in Figure 1. Suspend it from one terminal of the D cell (Figure 2), hold one end of the copper wire on to the other battery terminal and allow the free end to brush against the outer rim of the magnet.

All being well, the magnet should birl away in a gal-lus fashion. Be aware that the copper wire may heat up and that battery life will not be overly long. Also, we have heard reports of neodymium magnets attaining angular speeds of 10,000 rpm. Thus, we recommend eye protection if such magnets are used. Strong magnets of this type can pinch fingers and skin when attracted to a magnetic object and are especially dangerous if swallowed. Do not put such magnets near pacemakers or objects with magnetic data such as credit cards or floppy discs.

Figure 3 gives a clue as to how the motor works.

The magnetic field (red arrows) is perpendicular to the surfaces of the disk whilst the current (blue arrow) is radial. We therefore have a current in a conductor at right angles to a magnetic field. Such a conductor will experience a force at right angles to both the current and the field. In this case, the force will be tangential to the disk, so the disk spins. (Sharp physicists will note that for Figures 2 and 3 to match, we must be using conventional current in Figure 3!) The homopolar motor led us to investigate magnetohydrodynamics. This, and a largely ill-fated attempt to stir onion soup electromagnetically, will be described at a later date.

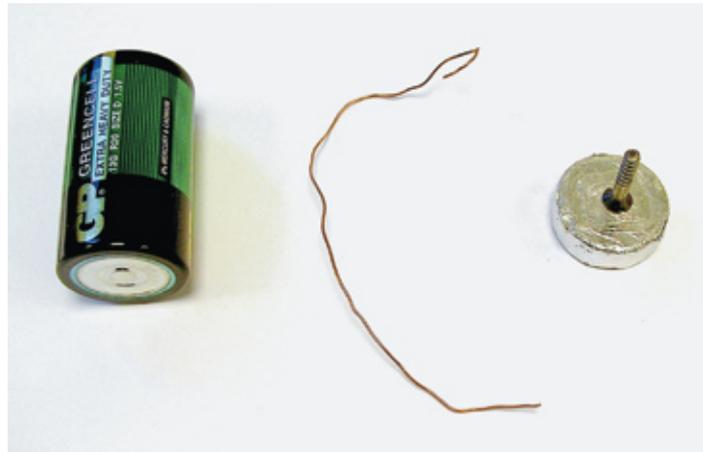


Figure 1 - Basic parts of a homopolar motor

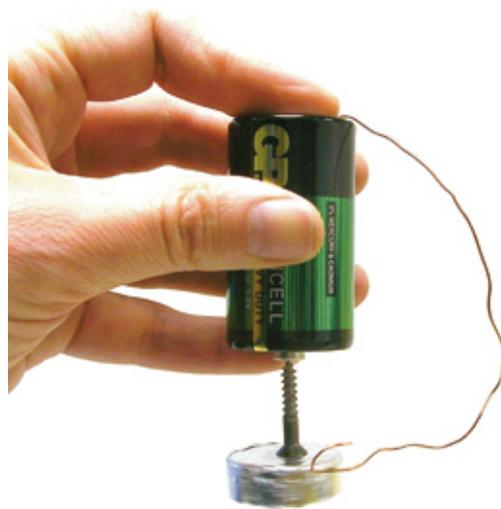


Figure 2 - Assembled homopolar motor

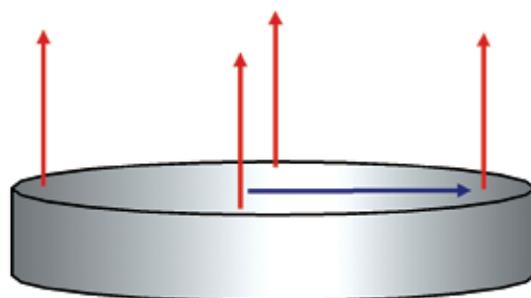


Figure 3 - field and current directions in the motor

Here we look at three of the latest interfacing solutions for school science, the Pasco Xplorer GLX, Vernier Labquest and the Asus EEE PC equipped with Go! Sensors.

Xplorer GLX



Figure 1 - The Pasco Xplorer GLX (front). Can it replace the other equipment in the picture?

The Pasco Xplorer GLX can be used either as a computer interface or a stand-alone data logging instrument. It has a greyscale 320 x 240 pixel LCD screen, which is backlit, and a keypad with alphanumeric and cursor keys. Like those on a mobile phone, three or four letters are allocated to each key - it does not have a full QWERTY keyboard. 12 MB of memory comes as standard. As well as a port for connection to a computer, the GLX has its own USB port to allow it to be used with a memory stick or peripherals such as a mouse or printer. It has a built-in loudspeaker and

sound sensor which also serves as a microphone, and comes with a voltage probe and two temperature probes. At the rear are four sockets for Passport sensors (Figure 2). Many schools will have the older Pasco ScienceWorkshop sensors. These can be used via the optional analogue or digital adapters (Figure 3). Full specifications can be found on the Pasco website [1].



Figure 2 - Sockets for Passport sensors

Two function generators are included on board. These can be set independently to allow beats to be heard. The Xplorer can run from a built-in rechargeable battery, replenished via its mains adaptor.

The inclusion of sensors means that the Xplorer can be used straight from the box. When one of the supplied sensors or a Passport sensor is plugged into the unit, it is recognised and the display changes accordingly. For example, when we attached an ultrasonic motion sensor, a graph of position versus time appeared on the screen. Using the cursor keys, we were quickly able to replace position with velocity or acceleration. Our trial investigation used a light gate and voltage probe to find out whether the voltage output of a model wind turbine was proportional to its angular velocity. Getting the display to graph one quantity with respect to the other was very straightforward. One criticism we had of Pasco's Data Studio ScienceWorkshop [2] software was that getting a graph with anything other than time on the X-axis was far from an intuitive process. The Xplorer presents no such difficulty, though scaling or zooming parts of the graph can be fiddly using the cursor keys. The answer here is to buy a USB mouse. These cost less than £4 from independent suppliers and make operating the Xplorer much easier. A USB keyboard may also be used.

A comprehensive suite of analysis tools are provided for data, including statistics, linear fit and area under the graph. The instrument also has a scope mode that allows it to behave like an oscilloscope. We found this useful for examining its data capture



Figure 3 - Xplorer and digital adapter

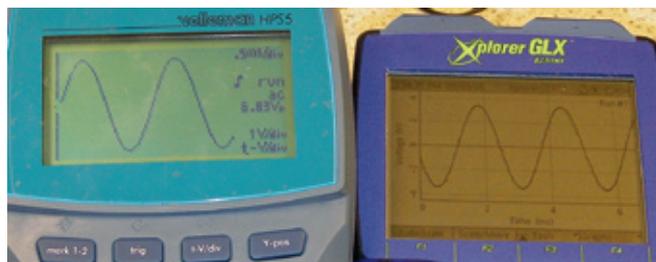


Figure 4 - Velleman and Xplorer at 400 Hz

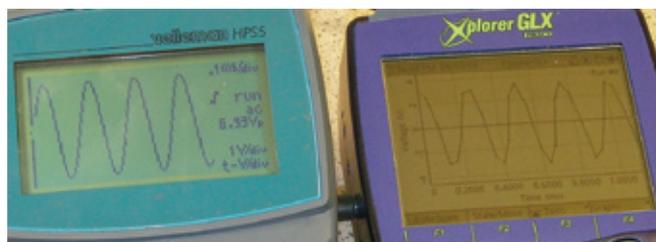


Figure 5 - Velleman and Xplorer at 4 kHz

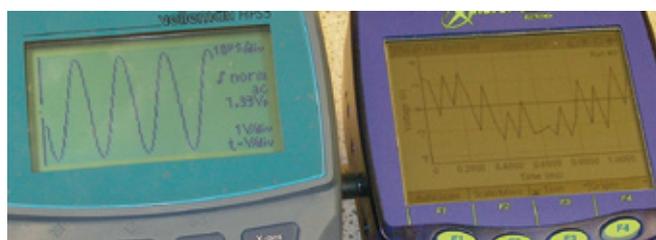


Figure 6 - Velleman and Xplorer at 40 kHz



Figure 7 - Picket Fence

rate. For comparison purposes, we pitched it against a Velleman HPS5 LCD 5 MHz oscilloscope, connecting both to a signal generator. The displays for approximately 400 Hz, 4 kHz and 40 kHz are shown in *Figures 4, 5 and 6* respectively.

Our Xplorer had a maximum capture rate of 25000 readings per second when used with the supplied voltage probe. This makes it perfectly adequate as an oscilloscope at 400 Hz. At 4 kHz, it is at the limit of its useful range and at 40 kHz the trace bears no relationship to the original signal. Its oscilloscope features are thus fine for the majority of classroom tasks up to the start of Higher Physics. Note that the data capture rate depends on the sensor used. It can be as high as 50000 readings per second.

All computer interfaces contain a piece of circuitry called an analogue to digital converter (ADC). This is because the output from temperature, sound sensors and their kind is a voltage. This analogue voltage varies infinitely between a maximum and minimum value. The ADC turns this into a binary number that the computer can use. The Xplorer has a 12 bit ADC. This means that it has 12 digits available to make binary numbers. It can therefore make 212 different binary numbers to represent voltages. 212 is equal to 4096. Taking the voltage probe as an example, it can measure between -10 V and +10 V, a range of 20 V. The voltage resolution, i.e. the smallest subdivision of voltage that it can measure, is thus $20\text{ V} \div 4096$ which is around 5 mV. Pasco tell us that some of their sensors have a higher resolution than this because AD conversion takes place in the sensor itself.

Used with an optional Pasco light gate and digital adapter, the Xplorer can be used for timing, speed and acceleration measurements. Note, though, that there is no facility to do double mask experiments. Instead, a multiple mask called a Picket Fence is available (*Figure 7*).

Vernier Labquest



Figure 8 - Labquest interface

Like the Xplorer, the *Vernier Labquest* (*Figure 8*) can be used as a stand-alone instrument or a computer interface.

It has a 320 x 240 pixel colour screen, which is touch-sensitive, and a set of cursor keys but no alphanumeric keypad. Instead, a keyboard pops up on the screen when required. On-board memory is 40 MB, expandable through SD or MMC cards. Ports include two for Vernier digital sensors (*Figure 9*), four

for analogue sensors, a USB port for memory sticks and compatible printers and a socket for connection to a computer (*Figure 10*). It is also possible to connect microphones, headphones and speakers to the unit.

The Labquest has a data capture rate of 100000 readings per second. It too has a 12-bit ADC, giving a 5 mV resolution with a voltage probe (available separately). Full specifications can be found on the Vernier website [3].



Figure 9 - Labquest digital ports



Figure 10 - Other Labquest ports

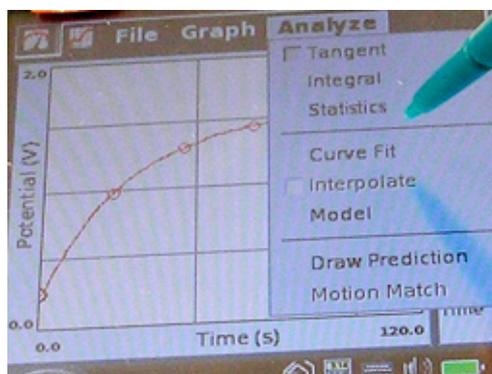


Figure 11 - Analysis tools menu

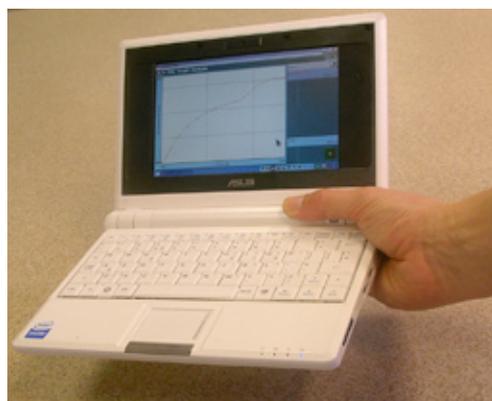


Figure 12: Small but beautifully formed (the Asus EEE, not the hand)

Analysis tools for graphical data are particularly easy to use due to the touch screen (Figure 11).

The Labquest can be used with Vernier light gates for kinematics measurements. An interesting feature is a comprehensive set of illustrated lab instructions, accessible via the File menu.

Asus EEE PC and Go! Sensors

SSERC bought some of these sub-£200 ultra mobile PCs (Figure 12) for staff who were on the road a lot as the *EEE* comes with a set of office-style applications and integrated Wifi. Rather than a conventional hard drive, it has solid-state storage making it far more resistant to shocks and jolts when compared with a conventional laptop. Its disc storage is small at 4 gigabytes, but this can be expanded through external USB devices or SD cards. Our EEE uses a version of the Linux operating system rather than Windows, though versions with *Windows XP* are now available. For day-to-day tasks, the EEE's Linux desktop was very easy to use, though, as we shall see, going beyond the mundane can be entertaining. Interaction with the Asus is via a standard keyboard and tracker pad. A mouse can be plugged in, as can an external monitor or projector.

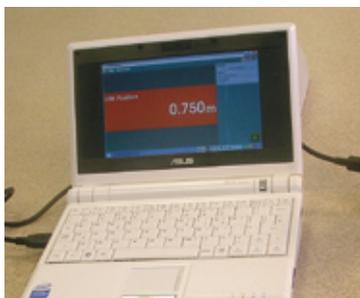


Figure 13: Asus EEE and Go! Motion sensor

We then heard from Instruments Direct Services [4] who also distribute the Vernier Labquest. IDS informed us that they had a version of their sensor software available for Linux. Having downloaded this, we followed the installation instructions whose hilarious complexity reminded us of the bad old days of MS-DOS. It should be stressed that Vernier are only beginning to work with Linux and we can anticipate this will become easier as they gain experience. Despite the rather obscure installation procedure, when we plugged a *Go!* Motion sensor (Figure 13) into the Asus USB port and started up the software, it was recognised immediately.

The free-to-download version of the Labquest software (Figure 14) was very like that built in to the Labquest interface.

With the *Go! Link* (Figure 15), a large number of Vernier sensors can talk to the Asus.

We have yet to fully evaluate the data capture rate and voltage resolution of this combination. What is of immediate interest is that there are now a number of inexpensive portable computers on the market that bring the age of "one laptop per child" tantalisingly close. A machine that does word processing, spreadsheets, presentations, internet access and interfacing is a useful beast. We found the Asus to be robust (yes, we dropped it) and easy to use.

Conclusions

We do not intend to recommend one of these interfacing solutions over the others. All have their strengths. The Xplorer was packed with features beyond those expected of an interface and came with a usable set of sensors. The Labquest had a clear, full colour touch screen that made using the on-board software very intuitive, and the Asus was a fully-fledged computer as well as a datalogger. What schools buy will be largely down to personal preferences and perhaps more pertinently what they already have in their science departments.

All three solutions allow pupils to gain direct experience of collecting and analysing data in the lab and in the field, using equipment that is as up to date as anything they will find in their business administration class. All the above interfaces cost under £300. If this still seems like a lot, here is something to consider. When we reviewed the Pasco ScienceWorkshop 500 interface in 1997 it cost £378 for a black box that was unusable without a computer. With data logging explicitly mentioned in *Curriculum for Excellence* draft outcomes (SCN 216F - *Using modern technology, for example a data logger, to gather and present information, I can analyse and compare the thermal insulating properties of materials and choose the most appropriate material for a particular purpose*), we hope that schools are given the means to carry out this activity using modern, easy to use equipment.



Figure 14: Asus screenshot



Figure 15: Go! Link adapter

[1] <http://www.pasco.com/products/probeware/PASPORT/glx/features.cfm>

[2] SSERC Bulletin 192

[3] <http://www.vernier.com/labquest/techspecs.html>

[4] <http://www.indso.co.uk>

Focus Educational Software Limited have in the past produced products such as:

- Resistant Materials,*
- Plastics-manufacturing processes,*
- Focus on Mechanisms,*
- Focus on Mechanical Toys and Focus on Wood Joints.*

A new addition to their software catalogue is:

Focus on Metals – manufacturing processes.

The software allows the study of twelve industrial processes via a range of animations, video clips and images support written text. This allows industrial practice into the classroom.

Computer based multiple choice tests are provided covering, all topics, casting, sheet metalwork and ‘how it is made.’ The ‘how it is made’ test involves product images and the correct selection of the manufacturing process involved.

Cost:

Single User:	£29.95
Unlimited User (1 Year)	£69.95



Figure 1 – Focus on Metals – Manufacturing processes

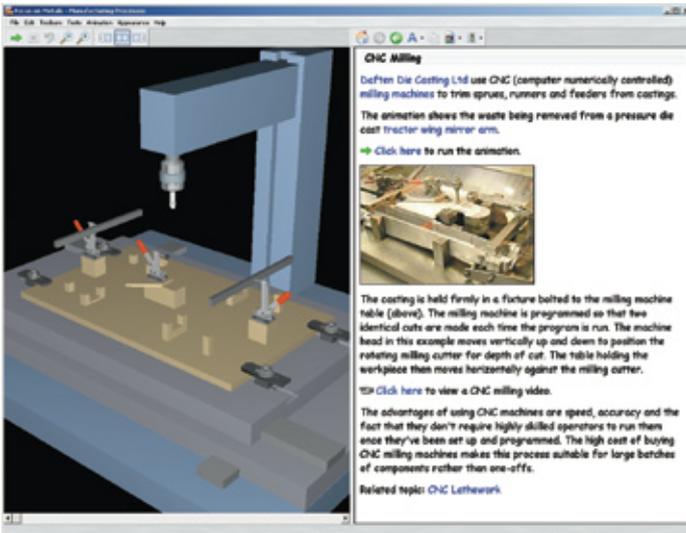


Figure 3 - CNC Milling, animation and text notes

Conclusion

Metals – manufacturing processes provides a cost-effective teaching aid. It also allows, in particular, S3-S6 pupils to investigate and research current industrial practice. Multiple-choice questions enable direct testing of pupils on Product Design courses. Animations provide excellent step-by-step sequences to be demonstrated and controlled by the user.



Figure 2 - Focus on Metals: Main Menu

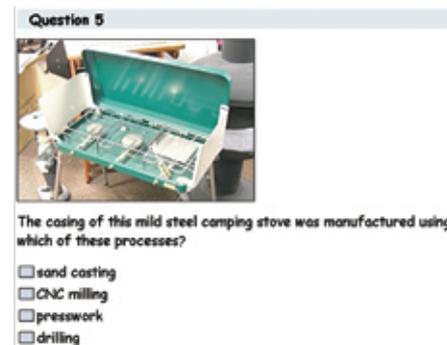


Figure 4 - 'How it is Made' Multiple Choice Test

Information and to download a demo:
www.focuseducational.com

An investigation of signs used within Technology departments



Figure 1 - Example of a Prohibition Sign



Figure 2 - Example of a Mandatory Sign



Figure 3 - Example of a Warning Sign

The Health and Safety (Safety Signs and Signals) Regulations, 1996 [1] standardised signs throughout the European Union.

The presence of each sign dictates and hopefully modifies our behaviour! Signs set standards of health and safety which must be maintained by law.

Signs which have a red circle with a red diagonal on a white background are the **Prohibition** signs. This sign says ‘**You must NOT**’ (Figure 1)

Signs which have a white symbol on a blue background are **Mandatory** signs. This sign says ‘**You must DO**’ (Figure 2)

Signs which have a black symbol and border on a yellow background give a **Warning**. This sign says ‘**You must exercise Caution**’. (Figure 3)

How good is the current signage in our Technology workshops? Let’s consider three machines; the circular saw, the planer-thicknesser and the bandsaw – the high-risk machines. What signs are required by law? What signs are actually displayed?

Try the following

On Table 1, tick in the left-hand box for signs that are currently displayed at each of the following machines in your Technology department. Compare your list with the minimum signage which **should** be displayed (right-hand box). This represents the minimum number of signs; local circumstances might dictate the need for more signs!

How did you compare? Does your department measure up to the requirements or do you need to get more signs? Care needs to be taken when producing your own ‘signs’ for example, the blue part of mandatory signs needs to be at least 50 % of the area of the sign. Only signs conforming to HSE regulations and British Standards [2] are acceptable.

Sign:	Circular Saw	Planer / Thicknesser	Bandsaw
	✓	✓	✓
	✓	✓	✓
	✓	✓	
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	✓		

Table 1 – Compare your signage with the minimum requirements

References

[1] Signpost to The Health and Safety (Safety Signs and Signals) Regulations 1996 – HSE - <http://www.hse.gov.uk/pubns/indg184.htm>. Guidance on Regulations - ISBN 0717608700, Price £8.50, www.hsebooks.com

[2] Safety signs and Colours - British Standards BS 5378: Parts 1 and 3: 1980.