SSERC BULLETIN

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Ideas and Inspiration supporting Science & Technology

Producing a Key- A Different Perspective

Introduction

Use and production of classification keys is an integral part of many school Biology courses. Keys also play an important role in fieldwork. Unfortunately, activities involving their use are often relegated to book-based exercises whereby pupils are required to look at pictures rather than get hands-on experience of real organisms either within the classroom or in the field.

The activity described below extends a familiar exercise for teachers and pupils and explores it from a slightly different angle. This exercise helps pupils to develop observational skills and allows for engagement in teamwork. The activity also highlights the potential of the 'Outdoor Classroom' for teachers, whether it be part of the school grounds, or the wider local area. In addition, through this activity, we aim to challenge teachers in terms of thinking about inclusion of different learners and different styles of learning.

FIGURE 1

The Activity

Pupils are initially presented with the challenge of producing a key that could be used by people who are blind. They should be encouraged to think about the problems that a blind person would encounter and the skills they would be able to use in trying to identify specimens. Working in groups of three, pupils are then required to produce a 'paired statements' classification key which they would read out. From this, a blind person should be able to identify a number of biological specimens, either in the classroom or out in the field. It is important, therefore, that descriptions should relate to the sense of touch. Pupils would also have to think about the use of precise language in the production of the paired statements.

FIGURE 2

Setting up the Activity

The keys activity can take place outdoors or in the classroom using specimens that have been collected beforehand should outdoor conditions not permit. However, access to suitable school grounds or a local area would be the preferred option. The instructions below are for use of the activity in the classroom. Modifying the activity for outdoor use would depend very much on facilities available to individual schools, and would require careful forward planning.

FIGURE 3

Equipment required for each group

Pen/Pencil
Plain paper
Blindfold[1] (See Figure 1)
Tray of 4-5 bagged specimens identified by letter only[2]

FIGURE 4

[1]Standard safety glasses painted with black paint. Alternatively, pupils' scarves may also be used.
[2]Specimens used could be deciduous leaves or twigs if done during the winter months, deciduous fruits, conifer needles, cones, bark, seashells, supermarket fruit. Some thought should be given as to easily identifiable differences in shape and texture of the specimens.

FIGURE 5

FIGURE 6

FIGURE 7

FIGURE 8

When trying out this activity in November, we used fruits from deciduous trees such as horse chestnuts, hazelnuts, and beech mast which could be kept reasonably well-preserved. A selection of common seashells such as mussels, cockles, and whelks were also used. These were soaked in 1% bleach solution and dried before use (see Figure 2).

Pupil procedures

Pupils can be organised into groups of three in advance of the activity. This allows for one member of the group to move to another group to play the 'blind' person once the keys have been completed.

The groups are each given a tray of labelled specimens. We recommend that each group be given different specimens, and that the exercise is the same for each group.

Pupils are then encouraged to examine the specimens and try to think carefully about how each one feels in terms of shape and texture (Figure 3). Wearing a blindfold while doing this is recommended as it removes the sense of sight from the preparation of the key and focuses in on touch. In initial trials we found that using the sense of sight often got in the way; in that instance, specimens were described in ways that were very much influenced by sight as well as touch.

The time taken for keys to be completed is usually about 30 minutes. At this time, the designated 'blind' person in each group can be asked to move own to another group to try out the new group's key (Figure 4). If time is short only one specimen from the tray may be identified. Pupils can then make amendments to their keys as necessary.

Applications

The activity described above is suitable for use with groups of pupils in S1/2 Science. It would also provide a meaningful exercise for those studying Standard Grade Biology, particularly through the Biosphere and World of Plants topics.

Use of different types of keys and different varieties of specimens would allow differentiation within the keys activity. For example, creation of branching key might allow less able pupils to engage with the activity more successfully Types of specimens used could also be altered depending on the target group: a selection of common supermarket fruits might be of use with a SEN group, where the sense of smell may also be used to help with identification.

The methodologies used in this activity support Curriculum for Excellence in a variety of ways. They will encourage creative thinking and pupils will apply their learning in a different context. The activity should also help children to relate to others who cannot see.

Speed of a Radio Controlled Car

Following our piece in SSERC Bulletin 221 [1] on the use of digital video cameras in science classes, we take a look at simple motion analysis using the video editing software supplied with later versions of Microsoft Windows® operating system. The screen shot below comes from Windows Movie Maker 2, a free video editor that comes with Windows XP Service Pack 2. If you do not have it, it is available from Microsoft [2] as a free download. The clip opposite shows a radio controlled car driving along the length of a metre stick. It was loaded into Movie Maker by clicking Import Video.

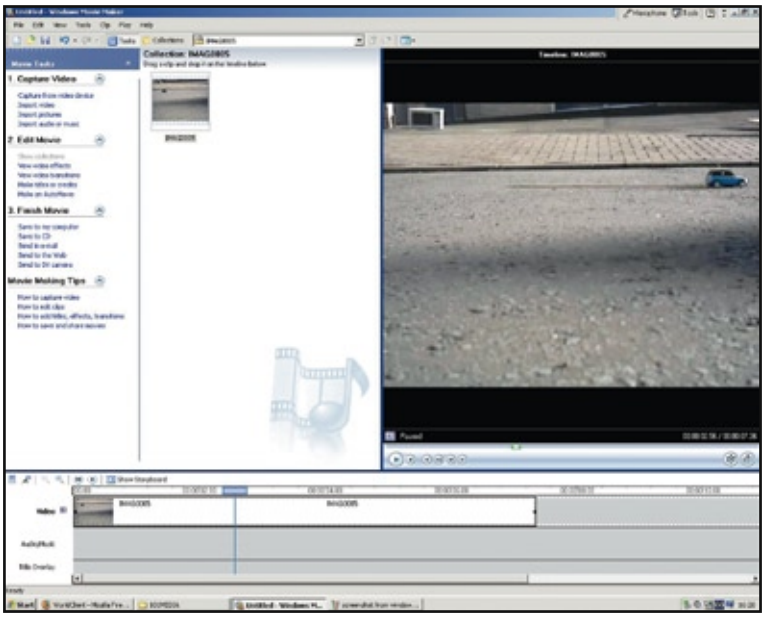


FIGURE 1: WINDOWS MOVIE MAKER

The controls shown in figure 2 allow the video to be played, stopped or advanced backwards and forwards one frame at a time.

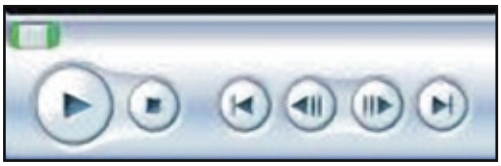


FIGURE 2: MOVIE MAKER CONTROLS

In figure 3, the controls have been used to step through the film until the model car is at the start of the one metre run. At the bottom right of the screen is a timer showing that this occurred 1.36 seconds into the clip.

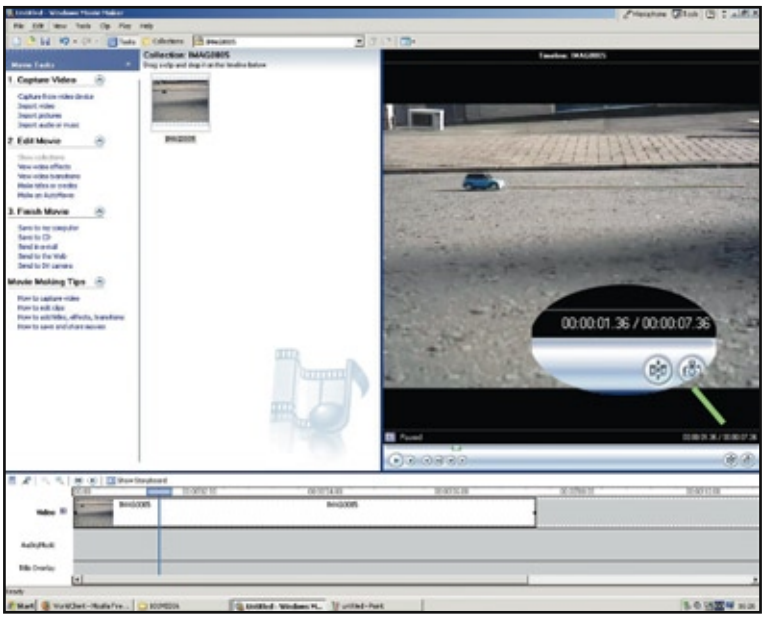


FIGURE 3: REMOTE CONTROLLED CAR AT THE BEGINNING OF ITS 1 M RUN. INSET SHOWS TIMER READINGS

- We have now advanced through the clip to the point where the car is at the end of its run. The time is now 2.56 seconds. It has taken the model 2.56-1.36 = 1.20 seconds to cover 1 metre. The car's average speed can therefore be calculated.

Is this Nissan Micra speeding?

In this example, a similar technique was used to estimate the instantaneous speed of a Nissan Micra, filmed passing a road sign. The time to pass the sign was found by analysing the clip using Movie Maker. The car's length was found by "Googling". (In this case, the car's speed turned out to be a sedate and legal 11 ms^{-1}, i.e. around 24 mph.) This could be set as an open-ended challenge to pupils to get them thinking about average and instantaneous speeds. One scenario is that pupils are told that the car in the movie clip was caught on CCTV just before an accident. Was it going too fast? How could they find out?

- Note that Windows Movie Maker shows the time in the format hours:minutes:seconds: tenths and hundredths of seconds. Other video editors give it in the form hours:minutes: seconds:frames. For these applications, the calculations are less intuitive.

- It is not suggested that these techniques are used for serious quantitative work. With frame rates of between 10 and 25 frames per second, the cameras are not really suitable for detailed analysis. A video camera does not take a series of sharp images. Rather, moving objects appear blurred in individual frames, making precise measurement impossible. It is still possible to do qualitative work. By looking at the approximate distances moved between each clip, pupils can work out whether vehicles were accelerating, decelerating or travelling at a constant speed.

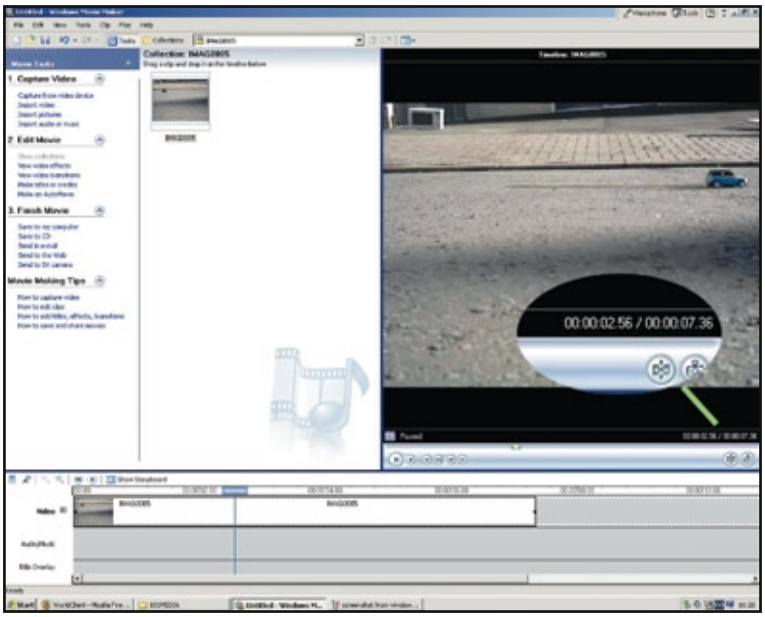


FIGURE 4: REMOTE CONTROLLED CAR AT THE END OF 1 M RUN.

FIGURE 5: A SINGLE FRAME FROM THE NISSAN MICRA CLIP.

A future article will cover the advanced analysis possible using free-to-download software.

[1]http://www.sserc.org.uk/members/SafetyNet/bulls/221/ICT.htm

[2]http://www.microsoft.com/windowsxp/downloads/updates/moviemaker2.mspx

Evans² CHEM WEB

The online solution to High School Chemistry in Scotland.
www.evans2chemweb.co.uk

Evans² ChemWeb have been negotiating to find a way of allowing schools to access the website materials without the hassle of paying any annual charges. This is also to save considerable time in collecting and managing subscriptions.

SSERC has agreed to cover their running costs for the coming year. This means that all teachers & technicians in Scottish local authority schools and subscribing organisations to SSERC will be able to access Evans² Chemweb free of charge.

Schools not subscribed to the services of SSERC can do so by visiting SSERC at their website **http://www.sserc.org.uk/** where they can find details on how to join.

However, for these schools, Evans² ChemWeb will also be able to offer annual access to their site by direct application without joining SSERC for an annual charge of £3.00 for the period January 2008 – December 2008.

Evans² ChemWeb are grateful to SSERC for their sponsor-ship for the coming year, and hope that this can continue into the future.

They are aware that a small number of schools have already paid for access to Evans² Chemweb for the session starting January 2008. The payments for these schools will be held in their account. However, if a refund is required, please contact them and they will arrange this. Details of payment period can be found in the Teacherzone.

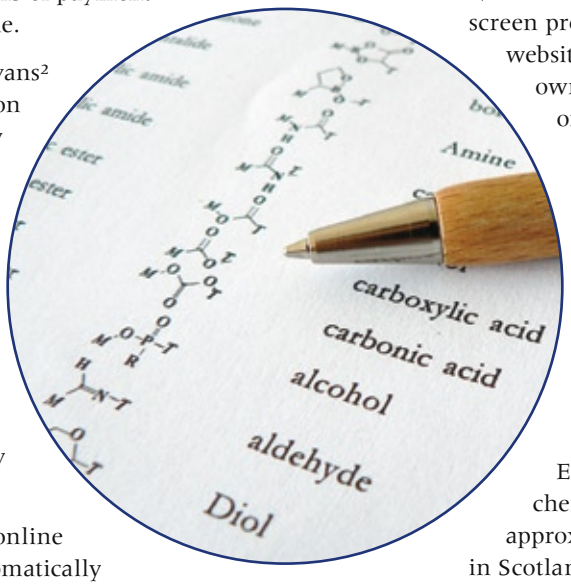
For anyone not familiar with Evans² ChemWeb, it is an interactive revision tools for High School Chemistry students in Scotland covering material from Standard Grade, Higher Grade, Intermediate 2, Intermediate 1/ Access 3, and Advanced Higher levels in Chemistry. The revision material consists of brief notes, worked examples for calculations, glossary of new terms, attractive graphics, animations and interactive 'mini-tests' allowing pupils to quickly assess their progress.

Each unit of work can be tested by online assessments (webtests) which are automatically marked to give immediate feedback to the student. Additionally the class teacher can also choose to receive an email summarising the assessment results for their own records. End of unit webtests at Standard Grade additionally provide more specific information to the student of strengths and weaknesses and offers remedial revision by directing the student to the relevant section in the revision material.

Other areas in the site for pupils include the virtual laboratory, Periodic Tables, SQA data booklet information, site search utility, links to other useful chemistry websites and useful tutorials (with interactive assessment) on writing formulae, balancing chemical equations, mole and concentration calculations (including titration calculations).

The 'TeacherZone' area of the site allows teachers to personalise the site for their school. Teachers can upload school crests/ badges, teacher photos (to allow pupils to select their teacher when they log in), change or add email addresses (not shown or available to pupils) to allow them to receive results of completed webtests, switch on or off email notification of webtest results or add or remove teachers from their login page.

The 'TeacherZone' also allows teachers the ability to contact other registered teachers directly via email, access to the ChemWeb forum (where users can share resources or get advice, or download the animation pack for full screen projection of the animations used in the website), the ability to simply create their own webtests or short mini tests using an online wizard to guide them through the process, and also includes a school personalised report writing wizard that can speed up the process of writing reports.



Once registered, all pupils and teachers at that school have unlimited access, both at school and at home to all of the resources on the site.

Evans² ChemWeb is already a major chemistry resource in Scottish schools with approximately 300 schools and universities in Scotland currently using the site.

Diji Pipettes

Introduction

It is some time since SSERC has had the opportunity to review any new style of glassware. Glassware doesn't change much and what is around in schools is likely to be largely the same as was used thirty years ago. Volumetric glassware is a good example.

Here we describe a new, safer-style pipette called the diji-pipette made by Diji and compare how well it performs against traditional graduated pipettes.

Description

Diji describe it as a hybrid between a syringe and a pipette. Indeed it looks like a graduated (Mohr) pipette with the pipette filler permanently attached to it and, like the Mohr pipette, is manufactured to the BS700 standard. It is made up of two working parts which are securely screwed together.

FIGURE 1

The graduated pipette part (called a syrette) (Figure 1) is coated with fluoro-plastic (FEP) and has a thread at the end. This screws into the diji hand-piece part (Figure 2) and can therefore reduce the potential for glass piercing injuries which can occur when attaching traditional pipette fillers to glass pipettes. Glass and liquid are also constrained by the FEP coating if the glass breaks.

The system draws liquid into the syrette using a flexible piston rod which shortens as the liquid fills the syrette and lengthens as liquid is expelled (Figure 3). The hand-piece has an ergonomic shape, which fits neatly into the hand, and is colour coded according to the maximum pipette volume.

FIGURE 2

A good range of sizes are available, with maximum pipette volumes of 1, 2, 5, 10 and 25 ml. The graduations on the syrette are clearly marked in colour making them easy to read, even with coloured solutions.
The manufacturers claim that it is more accurate than an A grade volumetric pipette.

Performance

FIGURE 3

The syrette is filled by gently stroking the piston rod upwards with the thumb. As the syrette is acting like a syringe, all of the air is normally removed by drawing liquid into the syrette and expelling it several times before filling the syrette to the required volume. It is not necessary to bring the pipette to eye level when reading the volume. The volume is measured from where the top of the cone seal on the bottom of the piston rod touches the glass wall of the syrette. There is a grey band on the seal at this point.

The syrette is easily cleaned by simply filling and emptying with water, but the whole system can be disassembled if a more thorough cleaning is required. It is even safe to autoclave the glass part of the syrette without damaging it or affecting its accuracy.

The accuracies of the 25 ml and the 10 ml diji-pipettes were compared with that of a single measurement bulb pipette and a graduated pipette by weighing 25 ml and 10 ml of expelled water using a two decimal place balance.
We found their accuracies to be within the specified limits of ± 0.2 ml and ± 0.1 ml respectively.

Reading	25 ml Volumetric pipette (g)	25 ml Graduated pipette (g)	25 ml Diji-pipette (g)	25 ml Diji-pipette after autoclaving (g)
Range for 10 measurements	24.89 - 24.93	24.71 - 24.79	24.82 - 24.89	24.82 - 24.89
Average for 10 measurements	24.91	24.75	24.86	24.86

Reading	10 ml Volumetric pipette (g)	10 ml Graduated pipette (g)	10 ml Diji-pipette (g)	10 ml Diji-pipette after autoclaving (g)
Range for 10 measurements	9.98 - 10.01	9.98 - 10.02	9.96 - 10.05	9.98 - 10.03
Average for 10 measurements	9.99	9.99	10.00	10.01

Diji Pipettes

Discussion

A number of the SSERC staff are currently using these pipettes and have commented favourably about them. The biologists, especially, have found them very useful in preparing coloured buffers for photosynthesis experiments using algal balls.

The combined pipette and pipette filler is shorter and more comfortable to use than the standard arrangement and much more secure. The filling technique requires some practice before actually using the diji-pipette, but one great advantage of the syrette is that once fluid is taken up, it should not leak out, even if the syrette is laid down on the bench. If it does, then the seal can be adjusted to achieve a better fit.

By clamping the diji-pipette into a stand, it can also be used as a simple burette to introduce the concept, and technique, of titrating, but only for rough titrations where the degree of accuracy is not critical. The piston rod is much easier to manipulate than a ground glass burette tap, and the technique could be introduced using the diji-pipette, progressing to a proper burette at a later stage.

Conclusion

Diji-pipettes have multiple possible uses and are a very useful addition to the glassware store. They have a sturdier design than conventional pipettes and the tip of the syrette is tougher and less prone to break. They are more expensive than the standard pipette and filler, but in the event of an accident, both the piston seal and the syrette are replaceable with spare parts available from the manufacturer. It is therefore unnecessary to replace the complete unit if something breaks. Syrettes are also available in plastic. The plastic type is interchangeable with the hand filler pieces and the FEP coated glass type.

SUPPLIERS			
Edu-Lab, Karoo Close, Bexwell Business Park, Bexwell, Norfolk. PE38 9GA. Tel: 01366 385777 Fax: 01366 386535			
Code: EDU1000	10 cm^3 Diji-Pipette	Grade B	£24.95 each
Code: EDU1000-5	10 cm^3 Diji-Pipette	Grade B	£110 pack of 5
Code: 712-008	10 cm^3 Diji-Pipette	Grade A	£29.50 each
Code: EDU1001	25 cm^3 Diji-Pipette	Grade B	£24.95 each
Code: EDU1001-5	25 cm^3 Diji-Pipette	Grade B	£110 pack of 5
Code: 712-018	25 cm^3 Diji-Pipette	Grade A	£29.50 each
Spares List (as at 12/07)			
For 10 cm^3			
Code: 712-010	Telescopic rod + handpiece		£13.50
Code: 712-011	Tip Assembly Set non-meniscus pack 10		£19.99
Code: 712-012	Connection Piece pk 10		£4.95
Code: 712-013	Syrette Glass Grade B pack 5		£55
Code: 712-014	Syrette Glass Grade A pack 5		£69
For 25 cm^3			
Code: 712-020	Telescopic Rod + handpiece		£13.50
Code: 712-021	Tip Assembly set non-meniscus pack 10		£19.95
Code: 712-022	Connection Piece pack 10		£4.95
Code: 712-023	Syrette Glass Grade B pack 5		£55
Code: 712-024	Syrette Glass Grade A pack 5		£69
Scientific and Chemical Supplies			
Unit 13, Airways Industrial Estate, Pitmedden Road, Dyce, Aberdeen. AB21 0DT. Tel: 01224 774 667 Fax: 01224 774 668			
39 Back Sneddon Street, Paisley. PA3 2DE. Tel: 0141 887 3531 Fax: 0141 889 8706			
Code: PRF 080 010	10 cm^3 Diji-Pipette		£29.93
Code: PRF 080 020	25 cm^3 Diji-Pipette		£29.93
Griffin Education, Bishop Meadow Road, Loughborough. LE11 5RG. Tel: 01509 555 944 Fax: 01509 231 893			
Code: PMR300250M	10 cm^3 Diji-Pipette	Grade B	£25.00
Code: PMR300100Y	25 cm^3 Diji-Pipette	Grade B	£25.00

Dangerous VdG Speed Controller

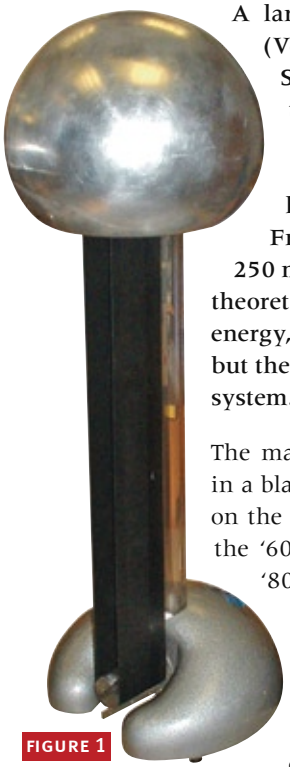


FIGURE 1

A large Griffin Van de Graaff generator (VdG), sometimes known as the Griffin Senior, (Fig. 1) was brought to us for testing, the school being concerned that it could be capable of producing a dangerous spark from the dome having read SSERC Bulletin 223[1]. From the size of the dome, about 250 mm diameter, the machine is indeed theoretically capable of storing 1.0 J of energy, which could be rather dangerous, but the greater danger is the mains electrical system.

The machine at fault had a speed controller in a black Bakelite box with ventilation grills on the top and bottom, the version dating to the '60s and '70s. (It was redesigned in the '80s with a 2-tone grey, metal case and improved mains connectors.)

The 3-wire mains cord from the 13 A plug goes via the speed-control box to the VdG motor. Within the speed-control box there is a large wire-wound variable resistor which is in series with the motor on the phase-live supply line. Above and below the variable resistor are large circular apertures in the Bakelite panels, top and bottom, covered by wire mesh. The following hazards were found:

- The size of mesh is too large. (> than 1 mm) (Fig. 2).
- If the mesh is depressed, it can touch the wire windings on the resistor, which are live at 230 V a.c. (Fig. 2).
- The meshes are unearthed (Fig. 2).
- The power connector between the control box and VdG is a 3-pin Bulgin plug (Fig. 3). This has unshrouded pins at mains voltage which can be opened easily by hand and does not adequately provide strain relief on the cord.
- The VdG base is not connected to the protective earth conductor. Whether this is by design or as a result of a fault condition, we did not have time to find out.

FIGURE 2

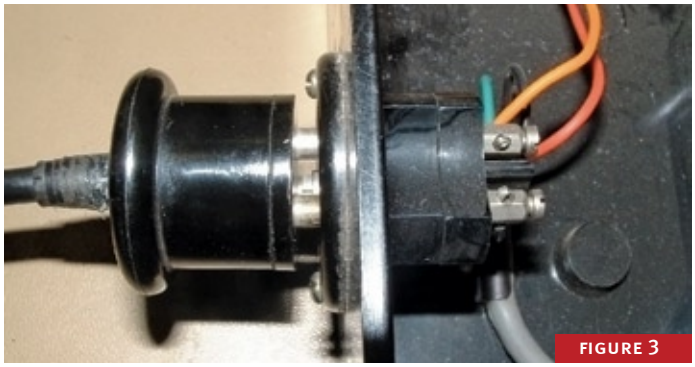


FIGURE 3

Apparatus with multiple faults such as these above should be taken out of service and either disposed of and replaced, or re-conditioned. Replacement is much the better option. Think of the image you present to the kids every time you produce apparatus like this VdG, designed in the '60s. The main problem with reconditioning the apparatus is that the job must be done competently. There is a significant chance that repairs, however well intentioned, might result in other dangers.

Another concern is why apparatus like the Griffin Senior is still in service when it carries the labels of two different electrical contractors who have tested it for safety. Why does it keep passing annual safety tests when it should have been failed?

A report on the faults of the Griffin Senior was published in the Bulletin in 1998[2]. Moreover it is probable that SSERC issued a warning to Regions in the '80s following an incident wherein someone got an electric shock. In addition the dangers of this speed controller, and Bulgin connectors and unearthed metal panels, were pointed out in our electrical safety training courses. We know that several hundred teachers and technicians will have handled this actual speed controller, and also these Bulgin connectors on other apparatus, on SSERC courses and been asked what's wrong with them. Yet we understand that this apparatus is still held by several schools. It just shows how difficult it is to get safety information to the persons who need to know. Perhaps it also shows that when persons find out about a problem they do nothing about it. Alarmingly we see how ineffectual are some of the routine electrical tests. Furthermore it may point to the lack of proper safety management by some employers. Last but not least in this litany of blame is the chronic underfunding for apparatus in science in some parts of Scotland. In some circumstances this can cause staff to ignore problems they feel they can do nothing about.

References

1. Van de Graaff generator hazards Bulletin 223 2007
2. Van de Graaff problems Bulletin 195 1998.

Figure 1
Griffin Senior Van de Graaff generator with speed controller. Product codes: L81-280, then XJE-400. Overall height = 760 mm. Dome diameter = 250 mm.

Figure 2
Wire-wound resistor in speed controller with circular aperture in bottom panel covered by wire mesh.

Figure 3
Mains supply to VDG motor is taken through this Bulgin connector from the speed controller.

TECHNOLOGY: Safe Use Of Fixed Workshop Machinery

The Technician CPD Project was set up in 2005 and one of its first tasks was to undertake a survey of the provision of technical support for schools in local authorities in Scotland. The survey covered a number of areas, one of which was training needs.

It was found that not all users of fixed workshop machinery had been trained in their safe use and could not be deemed as 'authorised' users. One of the priorities for the project team was therefore to develop a course in the safe use of machinery.

Under the Health and Safety at Work Act 1974 all employers are required to provide, as far as is reasonably practical, all information, instruction, training and supervision necessary to ensure the health and safety at work of their employees.

Employers are also required under the Management of Health and Safety at Work Regulations 1999 to take into account all employees' capabilities with regard to health and safety.

It is essential that employees are competent to undertake the tasks expected of them. Proper health and safety training should be provided to employees on induction into the school or similar establishment and when exposed to any new or increased risks.

The scope of the training should cover basics of relevant health and safety law:

- Health and Safety at Work Act 1974
- Management of Health and Safety at Work Regulations
- Provision and Use of Work Equipment Regulations 1998
- Control of Substances Hazardous to Health Regulations 2002

In addition all users should have knowledge of and access to the following health and safety reference guide:

- BS4163:2007 Health and Safety for Design and Technology in schools and other similar establishments – Code of Practice

The following are details of a course that has been developed by the Technician CPD Project team to enable employers to comply with the above requirements.

Course Title: Safe Use of Fixed Workshop Machinery

This 2 day course has been credit rated and levelled by the Scottish Qualifications Authority (SQA) within their Scottish Credit and Qualification Framework (SCQF) at level 5 with 2 credit points.
On successful completion of the course candidates are presented with a SCQF, SSERC/STAG certificate.

Purpose of Course

The course is designed to instruct candidates on the safe use of bandsaws, circular saws and planer thicknessers. It also aims to instruct them on the safe procedures for carrying out associated tasks such as blade changing and the inspection and cleaning of dust extraction systems.
Access to the course will be at the discretion of the centre but there must be evidence that candidates have undergone training in the use of fixed workshop machinery. This prior training can be either college or school based.
Thus rather than train beginners in how to operate machinery, the course sets out to train machine operators to work safely and provides them with the means to become certified competent machine operators.
The course is assessed. Assessment is by a closed-book written test and by practical assignments under supervision.

Training Centres

Due to the practical nature of this course the number of candidates is restricted to six per course. At present we have identified only one training centre with facilities suitable for running it. We are currently in the process of identifying other suitable centres in a number of local authorities. It is envisaged that this will enable us to deliver the course on a more frequent basis.

The course is open to both teachers and technicians who are required to operate woodworking machinery in school technology departments.

[1]STAG: Scottish Technicians' Advisory Group

Although many injuries are prevented by residual current devices (RCD), there is a lack of confidence that they will operate reliably. To what extent can the devices be trusted? An indication of how often they fail to work has been published by the Electrical Safety Council, giving the findings of a 2-phased research programme [1].

The first phase looked at the results of studies carried out in other countries in the early 1990s. One in Italy where 21,000 RCDs were tested found 7% to be faulty. These are significant failures, but do not necessarily apply today because of improvements in design and manufacture. However the research has led to a better understanding of why RCDs fail.

In the second phase of the research, conducted in the UK, a preliminary report from the Council after testing 607 RCDs records a failure rate of 3.8%, dropping to 2.8% when RCDs that had been deliberately shorted out are removed from the sample.

Why does an RCD fail? The likely causes are:
Deliberate shorting out (to prevent nuisance tripping)
Ingress of moisture and contaminants
Component misalignment
Disruption of contact surfaces causing contact welding

The ingress of moisture and dust was reckoned by many researchers as a major cause of failure. Either moving parts in electromechanical RCDs get clogged up, or circuit boards cease to operate properly – significant failure rates in electronically-operated RCDs were also reported.

These faults, in most cases, can be picked up by pressing the test button. In fact the main conclusion is that the reliability of RCDs will greatly improve if the test button that subjects the device to an earth-fault condition is operated regularly. This of course has to be followed up by replacing the faulty RCD without delay.

The form of RCD protection in school laboratories or workshops will vary. Some rooms will have RCDs mounted in an accessible location controlling all of the socket outlets in the room or workbench. In others, the RCD will be out of sight in a cupboard. Others will have RCDs on socket outlets. Yet others will have portable RCDs. Quite a lot to manage. Please see that they are tested regularly to the installer's or manufacturer's instructions.

Time your tests so as not to inconvenience others. Because a successful test will result in power being switched off, any computers will be powered down unless there is battery, or other form of, backup.

Recommendation

Check your RCDs regularly by depressing the test button. This will improve their reliability.
Replace if dud.

RCD protection

It is now 13 years since SSERC published its recommendation in the Bulletin [2] that some form of supplementary protection from the electricity supply should be installed in practical work areas. The follow-up is worth reporting on.

To explain why we had carried out research into RCD protection, like much of our work, it was demand led. A school was in dispute with their employer. When their request for RCD protection in a new suite of labs had been turned down by the council electrical engineer they turned to us for a second opinion. That's what triggered our risk assessment into the electricity supply, the result being our recommendation that science laboratories and technology workshops should have RCD protection. We sent our report to the school and published it in the Bulletin. Some weeks later we got a telephone call from a gentleman who introduced himself as the chief inspector of the National Inspecting Council of Electrical Installation Contractors (NICEIC) – the industry's independent voluntary regulatory body for electrical installation safety matters to whom electrical engineers go for technical advice in the Wiring Regulations. Telling us that one of his clients had sent him a copy of the article for comment he said that he didn't disagree with any of it (albeit that there was some wrong terminology) and asked for permission to copy the article to distribute to all 50 NICEIC inspectors for information.

Since our report, there has been raised recognition that RCDs, in areas used by the general public, are important in preventing death by electrocution from the mains supply. The Electrical Safety Council encourage their use in the home.

Yet from anecdotal evidence, many councils have been slow in fitting them in labs and workshops. A pity. Perhaps this reminder will get them interested.

References

Research into the in-service reliability of RCDs Switched On The Electrical Safety Council 7 2007.

RCD Protection Bulletin 185 SSERC 1995.

Physics Summer School 2008–

The Role of Physics Research in Delivering Excellence

A human sundial at last year's Physics Summer School

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For more details, see

http://www.sserc.org.uk/public/Events_News/list.htm#Physics_Summer_School_2008
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