SSR

March 2019
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The Association for Science Education

School Science Review

The ASE's journal for science education 11–19

FSC A level biology fieldwork

www.field-studies-council.org/alevelbiology

Up to **5** named practicals ticked off*

All **5** practical endorsement criteria assessed

3 stats tests taught

3 different ecosystems studied

36 hours of teaching

Just **5** days off the school timetable

FSC

Field Studies Council, FSC, is an environmental education charity providing informative and enjoyable opportunities for people of all ages and abilities to discover, explore, and understand the environment

*Actual course content will vary per specification

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The Association for Science Education

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Health & Safety

For all practical procedures described in *SSR*, we have attempted to ensure that:
- all recognised hazards have been identified;
- appropriate precautions are suggested;
- where possible procedures are in accordance with commonly adopted model risk assessments;
- if a special risk assessment is likely to be necessary this is highlighted.

However errors and omissions can be made, and employers may have adopted different standards. Therefore, before any practical activity, teachers should always check their employer's assessment. Any local rules issued by their employer must be obeyed, whatever is recommended in *SSR*.

Unless the context dictates otherwise it is assumed that:
- practical work is conducted in a properly equipped laboratory;
- any mains-operated and other equipment is properly maintained;
- any fume cupboard operates at least to the standard of CLEAPSS Guide G9;
- care is taken with normal laboratory operations such as heating substances or handling heavy objects;
- good laboratory practice is observed when chemicals or living organisms are handled;
- eye protection is worn whenever there is any recognised risk to the eyes;
- fieldwork takes account of any guidelines issued by the employer;
- pupils are taught safe techniques for such activities as heating chemicals or smelling them, and for handling microorganisms.

Readers requiring further guidance are referred to:
Hazcards (CLEAPSS, 2016 and updates)
Topics in Safety, 3rd edn (ASE, 2001; updates available at www.ase.org.uk/resources/topics-in-safety
Safeguards in the School Laboratory, 11th edn (ASE, 2006)
Preparing COSHH Risk Assessments for Project Work in Schools (SSERC, 1991)
SSERC hazardous chemicals database (www.sserc.org.uk/health-safety/chemistry-health-safety/hazchem_database-2/)
Be Safe! Health and Safety in School Science and Technology for Teachers of 3- to 12-Year-olds, 4th edn (ASE, 2011)

Editorial Board and Associates

Contributing to *SSR*

We welcome contributions for all sections of *School Science Review*. For reference, a full page of A4 text in the journal is about 800–850 words; including two small figures on a page would bring that down to about 600 words.

These can be emailed to The Editor, ssreditor@ase.org.uk, or posted to The Editor, *School Science Review*, ASE, College Lane, Hatfield, Herts AL10 9AA. Detailed advice on the submission of articles and Science notes is available on the ASE website at: www.ase.org.uk/content/submission-guidelines.

Themes being considered for the future for which submissions are invited:

- The periodic table
- Science applied to healthcare

Editorial

Two *Science notes* start the edition, both from long-standing contributors. Christopher Talbot, on this occasion with Norman Billingham, describes and explains the use of buffer solutions in practical chemistry. The style is intended to lead students through doing the practical work themselves; useful guidance is given on both practical and mathematical techniques. Frank Harris offers an interesting historical account of the development of batteries, which are so essential to modern life. Years ago, the common use for batteries would be for torches, and then portable radios. Now, there is greater interest in batteries for smartphones and laptops, applications that require the batteries to be rechargeable. However, an even bigger challenge coming our way is powering the electric car. Recharging can not yet match the convenience of using of liquid fuels.

Guest editor Keith Ross is another long-standing contributor. He introduces the theme on 'everyday science' on page 13. So often, we can become narrowly focused on working to exam specifications, getting the calculations correct and doing practical work in labs, and forget that there are many applications of science that students can, and should, experience outside school and beyond the guidance of teachers. We teach chemistry in school. Students or parents will go to a chemist's shop. How are these shops related to chemistry lessons? Just one article considers a pharmaceutical product, but science can be applied in the home and garden, and to many other everyday experiences.

Good teaching should ensure that, when students eventually leave school, they will still think in a scientific way about things they do at home and in the workplace. Making this connection, some articles focus on what we can see around us and on ways of helping to explain our observations. This should help to make science subjects seem more important and more relevant to those students who become disaffected by science during their years of compulsory education.

Two more articles complete this edition. Five authors have collaborated to suggest how students can become researchers. The core of the group is based at the National STEM Learning Centre in York and is supported by others from elsewhere. Internet communication makes such collaboration simpler than in the past.

It is always tempting for both students and teachers to work to the textbook. However, in addition to learning and explaining how things happen when they have already been discovered, science is also about discovering new things. Over a few hundred years, discoveries that enabled Isaac Newton, Michael Faraday, Charles Darwin and many others to become famous were made by those individuals on their own premises. Now, there is an expectation that science research demands expensive facilities with large teams of scientists and technicians. But are there small discoveries that students can make if suitably encouraged?

The final article is from Naomi Hennah and completes the series on 'open badges'. The first two articles were in our December 2018 edition. Open badges are not tangible like pin-on metal badges, but are images used in a record of progress that can he held on a computer, and they act as pictorial evidence of achievement. Open badges could move with the student from class to class or school to school, if the system becomes widely adopted. This development is reported by a teacher working at secondary level (age 11–18), but was trialled in the after-school activities of a primary school.

Overall, this seems to be a very accessible edition. Whatever your subject or educational specialism, I think it is possible to find many interesting articles here.

Geoff Auty
Editor, *School Science Review*

Safety notice

We published a photograph on page 75 of the December 2018 issue of *School Science Review* to illustrate that a practical activity with a high level of hazard can be effective in engaging students and give a context for effective learning. It is essential with hazardous activities to take sensible and effective precautions so that the chances of any serious harm are very low, otherwise the practical activity could become memorable for the wrong reasons. With planning and good design, this can be done without lessening the excitement of the activity. We apologise that the photograph does not show evidence of sensible or effective precautions. We strongly advise that the activity demonstrated in the photograph is not undertaken as shown. For that reason, we have removed the photograph from the online version of the journal.