



The role and relevance of science in addressing global concerns

Coronavirus update

Supporting your fieldwork needs



We've identified the best ways we can support teachers and ensure students benefit from vital fieldwork experiences this term:

- **day courses** at our centres, which have been transformed to operate in a fully Covid secure way;
- visiting schools to deliver **outreach** in their grounds or local area;
- a range of new **digital packages** where face-to-face is not possible.

www.field-studies-council.org/biology **FSC**

School Science Review

The ASE's journal for science education 11–19

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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, 12th edn (ASE, 2020)

Preparing Risk Assessments for Chemistry Project Work in Schools & Colleges (SSERC, 2020)

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)

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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/submission-guidelines.

This year, work, travel, sport, shopping and many other aspects of life have been dominated by the effects of coronavirus. In education, there was never going to be a valid replacement for exam results. Exams are used to decide the fate of our students and yet they are never precise in their discrimination. If grade A is awarded for 70% and above, B is 60% to 69%, C is 50% to 59%, a student who has achieved 69% is only one grade better than one who reaches 51% but they differ by a massive 18%. In contrast, 71% is one grade better than 69% but they differ by only 2%. Teachers are asked for estimated grades but their judgement is subjective. Some will simply give a match to mock exams (in which longer questions are marked subjectively). Others will look at mock exams, consider the work ethic of students and all else about their attitude and aptitude – and what they can learn in the remaining two half-terms – and decide to give a different estimate, which will rarely be lower.

Students this year have had different experiences. Most have missed nearly half a year of lessons, but children of 'key workers' have been going to school. They will have had more attention from teachers than those who were at home being contacted remotely at intervals. Home facilities, the number of children in the house and the ability of parents to help will have influenced the situation.

A newspaper headline stated, '*Congratulations to our 16-year-old students! Best GCSE results ever!*' But that was after a furore about the Scottish 'Higher' results 2 weeks earlier and A-levels in the remainder of the UK the following week, which led to a hasty change of plan because those results (perhaps better named as awards) were disappointingly low for many.

Universities will have had a preview and are accustomed to confirming offers as soon as the results are published. But in a year when the rioting on the streets has become a developing fashion, and messages on *Twitter* can spread just like coronavirus, but more quickly and over great distances, there were widespread demands for better grades at 18+ than had been decided by the exam boards. A consequence is that more university places had to be found, and yet students will, on average, be less well prepared than in previous years.

There was no correct way to replace examinations or account for a shortened year!

We are continuing to report on other consequences of coronavirus with a mini-section.

An interim report on a research project about Practical Assessment in School Science (PASS) includes consideration of the effects that COVID-19 will have on the feasibility of students doing individual practical work. The project will continue throughout this academic year.

From the University of Lincoln, a study concerns the effect of existing health literacy on decisions being made in trying to control problems due to COVID-19. This applies to those making policy decisions and to the general public receiving the messages they are given.

Retired physics teacher and long-standing contributor Frank Harris explains the mathematics behind the possible spread of an epidemic and the efforts to control it. Are local lockdowns making sense when they include both high-density urban and widely scattered rural communities?

Two letters to the Editor have been received. One from Mike Follows from Birmingham is thanking us for our coverage of coronavirus and expressing concern about potential consequences of a full return to school. Then Peter Borrows responds to Stuart Farmer in considering the distinction between hypotheses, laws and theories in providing structure for science.

Unable to fit it in our previous edition, we have now included the final part of Catherine Dunn's account of science using toys, which was first presented at the 2019 ASE Annual Conference. Then another overspill is the second part of Stuart Farmer's article questioning the effect of how teachers' own understanding of the nature science can influence their teaching.

There has been competition for space this year, and from Berry Billingsley comes the second part of the theme begun in our March edition. Changes in emphasis between earlier and more recent content, including more consequences of coronavirus, means it has a different title.

The remaining articles begin with Peter Lang, who considers how mental models have to be used in efforts to explain the properties of metals. More modelling of a kind is explained by Eric Fishman from the USA, by considering that stories can be used to help with explanations needed to develop understanding in science. He is working in a special school where perhaps he feels the freedom to stray further than normal from the basic required knowledge. However, I have always felt that the use of analogies is valuable in explaining many observations in science. To explain something that is not understood, we can start with something else that is understood and behaves in a similar way. Finally, a group from Lancaster University makes use of *Minecraft*, a video game that is very popular with children, to help with the understanding of science. These final articles were submitted independently and have come together by chance, but they all stray from the basic textbook explanations and appeal to children's enthusiasms to assist development of understanding.

Geoff Auty

Editor, *School Science Review*