Environment, Health and Safety Committee [EHSC]

Note On:

HEALTH AND SAFETY LEGISLATION AND PRACTICAL CHEMISTRY TEACHING IN SCHOOLS

SUMMARY

The UK requires well qualified scientists with a sound grounding in practical science. However both the amount of practical chemistry teaching in schools, and in some cases its quality, have declined in recent years. The requirements of health and safety legislation are often cited as a major reason for this. In fact legislation does not 'ban' any chemicals or procedures likely to be used in school chemistry. Furthermore the risk management procedures that apply to practical chemistry teaching in schools also apply to other sciences and to other areas such as physical education in schools.

1. INTRODUCTION

The Royal Society of Chemistry has serious concerns about the decline in the teaching of practical chemistry in schools. This Note argues that blame for the decline should not be placed on health and safety legislation.

The UK requires well qualified scientists with a sound grounding in practical science if it is to maintain its position as a leading scientific and technological nation. Chemistry is one of the most important of the sciences in this respect. However in recent years the amount of practical chemistry taught in schools has decreased and there are fears that this could compromise the supply of suitably qualified chemists.

One of the main reasons cited for the decrease in practical chemistry teaching in schools is concern about health and safety legislation. In some cases this has also fostered an overly cautious approach in the practical chemistry that is taught. These changes may have made chemistry less appealing to pupils and reduced their interest in the subject. There is also anecdotal evidence that school pupils may be less well prepared for practical work in industry and higher education courses.

Although there may be good reasons why some 'traditional' practical work has been replaced or abandoned, the evidence suggests that practical chemistry in schools does not and has not, posed a significant risk to pupils.

2. THE EDUCATIONAL BENEFITS

Practical chemistry teaching offers opportunities for students to gain hands-on experience in the safe handling of chemicals and chemical apparatus. More generally it also provides valuable training in the identification, assessment and control of risks - procedures which can be readily applied to the management of other activities.

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Practical science activities in schools include:

- Experiments, where students perform an activity or technique which illustrates a message, law or series of points,
- Investigations, where students try to find out about a scientific system using scientific method, and
- Demonstrations, where a teacher performs experiments in front of a class.

These activities give students a good grounding in the basics of practical science.

Practical chemistry also provides a break from the routine of text-based learning and gives opportunities for the teaching of scientific method, illustrated by examples of experimental techniques. It can have a dramatic element which is both enjoyable and memorable and can motivate students to regard chemistry as an active area of enquiry just as it is in the real world. Practical chemistry can also put the teaching of hazard and risk, and their management, into context.

3. HEALTH AND SAFETY LEGISLATION

Health and safety at work legislation was never intended to inhibit the teaching of practical science. It was intended to preserve the health and safety of those in the workplace, not to prevent them from carrying out practical activities. There is a wide range of guidance available to help ensure that all sorts of work activities are carried out safely and with minimum risk.

Perhaps the most wide ranging legislative requirements are those in the Management of Health and Safety at Work Regulations 1999, which apply to many types of risk and to almost all workplaces, including schools. However it is the requirements of the 'Control of Substances Hazardous to Health Regulations' [COSHH] which usually cause most concern, and in some cases confusion. COSHH requires the assessment and control of risks arising from the use of chemical and other substances. It does not prohibit the use of any chemicals other than a few specified substances that would not in any case be used in schools. Nonetheless anecdotal evidence suggests that some Local Education Authorities and school governing bodies are citing legislation as a reason to discontinue practical chemistry teaching.

It is important to recognise that a general legal requirement to manage risks effectively applies to all school activities including for example sports, technology, domestic science and outdoor pursuits. There is no reason to single out practical science, and practical chemistry in particular, as subject to unusual and onerous legislative requirements. The Health and Safety Executive [HSE] has produced a wide range of guidance on how to comply with health and safety legislation.

4. WHY HAS THERE BEEN A DECLINE?

Practical chemistry in schools is carried out for relatively short periods under professional supervision. Very few accidents occur in school laboratories. However for some reason a perception has developed that school science and school chemistry in particular are dangerous. This perception has, in some schools, led to the replacement of student hands-on experiments by teacher demonstrations and even the use of video or film illustrations. Consequently students can leave school with little or no personal experience of handling chemicals and chemical apparatus safely and with underdeveloped practical skills. Equally important they have not benefited from the more general benefits associated with practical chemistry as described above.

Much of the concern about teaching practical chemistry in schools seems to stem from misunderstandings about the difference between 'hazard' and 'risk'. Basically all chemicals have a range of different hazards. For example a substance may be poisonous if you swallow enough of it [like salt], and/or it may be flammable if you allow it near a flame [like petrol]. However providing steps are taken to control the hazards of a substance the risk of using it can be reduced to a safe level. An analogy with say sport may be reassuring – a cricket ball could kill if thrown at someone's head but few would suggest that cricket should be banned in schools.

Nonetheless despite the above there are indications that concerns about practical chemistry in schools can be more complex than they might appear. It is certainly true that governors and teachers may fear adverse publicity and possible litigation should things go wrong. However it seems that in some cases other issues, such as the cost of chemicals and equipment and the relative scarcity of teachers qualified in chemistry, may compound the decrease in practical chemistry teaching.

5. CONTROLLING THE RISKS

The basis for most health and safety legislation in the UK is risk assessment. Most of the legislation applies to all school activities, not just practical chemistry. The approach to controlling the potential risks from practical chemistry teaching is just the same in principle as that which should be taken to control any other type of risk in schools. All that is required to teach practical chemistry safely is to look at the way in which chemicals are used and to consider how to control the exposure of pupils [and teachers] so that any risks to health are acceptably low. There may be concern that the risk is not reduced to zero. However pupils are exposed to higher risks in many other school activities, e.g. sports, technology, and indeed when crossing the road to get to and from school. These have clearly been judged 'acceptable' even though they are not zero.

It is not difficult to control chemical risk and there is plenty of guidance available to help. Information on the hazards likely to be found in school chemistry laboratories is given in the data sheets published by CLEAPSS [the Consortium of Local Education Authorities for the Provision of Science Services]. Publications like the RSC's "COSHH in Laboratories" and the more recent HSE guidance "COSHH Essentials" explain the principles involved and give practical advice on managing potential 'health risks' from chemicals [in effect poisoning in the school context]. Other types of risk, such as burns, also need to be considered. Publications from the ASE [Association for Science Education] and the Department for Education and Skills [DfES], for example, give detailed advice tailored to the specific needs of schools.

6. CONCLUSION

Health and safety legislation was never intended to inhibit the teaching of practical chemistry but to ensure it is carried out with minimum risk. The Royal Society of Chemistry urges head teachers, classroom teachers and governing bodies to recognise the importance of practical chemistry and to ensure that the guidance they give to science departments is proportional to its relative safety compared to many of the other activities carried out in schools.

7. SOURCES OF FURTHER INFORMATION

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  Website : www.ase.org.uk

- 'CLEAPSS School Science Service', Brunel University, Uxbridge, UB8 3PH. Tel : 01895 251496. E-mail : science@cleapss.org.uk. Website: www.cleapss.org.uk
- Scottish School Equipment Resource Centre [SSERC], St Mary's Building, 23 Holyrood Road, Edinburgh EH8 8AE. Tel : 0131 558 8180. E-mail : sts@sserc.org.uk Website : www.sserc.org.uk
- Health and Safety Executive. Tel : 08701 545500. E-mail : hseinformationservices@natbrit.com Website : www.hse.gov.uk
- 'Classic Chemistry Experiments', K Hutchings, RSC, 2000, ISBN 0 85404 919 3.
- 'Classic Chemistry Demonstrations', RSC, 1996, ISBN 1 87034 338 7
- 'Safeguards in the School Laboratory', 10th Edition, ASE, 1996
- 'Topics in Safety', 3rd Edition, ASE, 2001
- 'Hazcards', CLEAPSS, 1995 [or 1998, 2000 updates]
- 'Laboratory Handbook', CLEAPSS, 2001
- 'Safety in Science Education', DfEE [DfES], HMSO, 1996
- 'Hazardous Chemicals. A manual for science education', SSERC, 1997 [paper]
- 'Hazardous Chemicals. An interactive manual for science education', SSERC, 2002 [CD-ROM]

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