Teaching science to pupils with special needs – health and safety issues

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A review of health and safety issues to be considered when pupils with various special educational needs are taught science in special or mainstream secondary schools

All pupils in England, Wales and Northern Ireland, including those with special educational needs, are entitled to follow the National Curricula for science. The consultation document (QCA, 1999) on the revised programmes of study from September 2000 lays much emphasis on access to the curriculum and many pupils with special needs do access science with great success. However, the presence of one or more pupils with special needs in a science laboratory can sometimes raise issues of health and safety. This article discusses some of the issues but it is far from comprehensive and contributions from those with relevant experiences would be welcome.

The range of special needs

There is a very wide variety of special needs and each has different implications for health and safety in practical science. The situation is complicated by the fact that some SEN pupils are taught in relatively small classes in special schools, often with rather poor science facilities and by teachers whose own science background may be quite limited. Others are taught in mainstream schools, in relatively large classes, where the teacher may find it difficult to give the individual attention needed. For pupils with severe learning difficulties the curriculum may not progress much beyond level 1, but this article is mainly about those pupils, of secondary school age, who will be able to follow the programmes of study for key stages 3 and 4 at some level.

A secondary school science teacher may well not know the precise nature of an individual's special needs or at least not understand fully the health and safety implications. For the most part, we are not talking about the provision of specialist or modified equipment, although occasionally that may be necessary. It is more to do with deciding whether a pupil with dyspraxia (a lack of coordination) presents such a danger to her/himself and others as to merit special treatment, at least in some activities. It is remembering to convey important safety messages orally, so that dyslexics or non-readers are included, whilst not forgetting the needs of the hearing impaired.

ABSTRACT
Pupils with special educational needs are entitled to a science education. Those with physical disabilities present different challenges to those with emotional and behavioural problems. The key, in all cases, is risk assessment. Teachers should consider how model (general) risk assessments in standard safety publications need to be modified for the situation in which they are working. Some examples are discussed and a range of strategies suggested. The problems of teachers in special schools are also considered.

Risk assessment

The whole approach to health and safety over recent years has been through risk assessment and teaching pupils with SEN is no different. Risk assessment is the employer's responsibility. The great majority of education employers have adopted various nationally available publications, such as *Topics in safety* (ASE, 1988), *Hazcards* (CLEAPSS, 1995/1998), *Hazardous chemicals: a manual for science education* (SSERC, 1997), etc. as model (general) risk assessments.

Schools are expected to follow the guidance, perhaps modified slightly to cater for local conditions. Model risk assessments are drawn up with average pupils and average teachers in average classes in mind. The presence of some pupils with some special needs may mean that model risk assessments need quite substantial modification. The examples below give some illustrations of what might be needed. It is hoped this will help teachers to think about suitable adaptations for their pupils' special needs.

Physical disabilities

Pupils who are visually impaired are likely to work with test-tubes, etc. much closer to their face than mainstream pupils. If the risk assessment suggests that eye protection is necessary, visually impaired pupils might need full face shields, rather than safety spectacles or goggles. Similarly, pupils with motor control difficulties may be more likely to splash chemicals and thus also need the protection of full face shields. We normally recommend that practical work, especially with liquids or when heating things, should be carried out standing up. If something goes wrong, it is easy to jump out of the way. Clearly, that would not be possible for a pupil in a wheelchair. Such a pupil might then need the protection of, say, a pvc apron when carrying out these activities. For similar reasons, pupils in wheelchairs will need benches of a lower height than normal in order to work safely. Benches of adjustable height, sometimes including gas, water and electricity, are available from several suppliers.

Emotionally and behaviourally disturbed pupils

We are usually happy to allow pupils to use tripods, knowing that the worst that could go wrong might be two minor burns on their fingers, as forgetful pupils pick up a hot tripod. However, a very disturbed pupil might start using the hot tripod as a weapon against his teacher or fellow pupils. The risk assessment in such a class would be very different from the norm. We might conclude that such a pupil could not be trusted with hot tripods. A mainstream school with one or two such disturbed pupils has a range of options. The use of hot tripods could cease whilst the pupil is present; clearly, this disadvantages the whole class. It might be possible, occasionally, to provide the disturbed pupil with very close supervision by, for example, a member of the support staff, a fellow science teacher or a member of the senior management. It may be possible to exclude the pupil from that particular lesson (but what happened to entitlement?). All solutions are full of difficulties but in the end the school cannot shirk the decision – and it is not just about tripods. While there is an entitlement under education legislation for access to the curriculum there is also a duty of care under health and safety legislation.

A school for emotionally and behaviourally disturbed pupils has a different problem – many, perhaps all, of its pupils are likely to lose control at some time. Science staff in an EBD school might well decide that there are a range of activities that are simply inappropriate for such pupils because of the risk. They might decide, for example, that such pupils could never be trusted with solutions classed as toxic or corrosive; thus the concentration of all acids and alkalis should be kept below 0.5 mol dm^{-3}. Staff might decide that heating activities using Bunsen burners cannot be carried out safely, or can only be carried out if sufficient support staff are present. Microbiological activities, in which samples taken from finger prints are cultured, might be thought inappropriate because of the risk that pupils will open the incubated Petri dish, despite all instructions to the contrary. Whatever strategy the school adopts, the risk assessment should be briefly documented, although not necessarily lesson by lesson. Broad principles, supplemented by a few examples would be sufficient for a mainstream school. The EBD school may have to be rather more systematic in laying down principles of what its pupils can and cannot do, that is, how model risk assessments will be modified to meet the needs of its pupils, and this should be recorded in the science safety policy.

Risk-control measures

The presence of pupils with special needs in a mainstream class may well increase the risk, both to the SEN pupil and to others in the class. A balance has to be struck. Pupils in wheelchairs are at greater risk, for instance from chemical spills, as they cannot jump out of the way. In order to gain access to the curriculum, in order to receive their entitlement, they and their parents have to accept a slightly greater risk. Most do so willingly – the educational gain is well worth the slightly greater risk (which in any case can be mitigated by suitable personal protective equipment). But the presence of a seriously disturbed child in a class may put the whole class at risk. If that child is liable to throw acid, should the class be allowed to use acid?

On the other hand, the majority of pupils also have an entitlement – to use acid, for example. There may be occasions when the acid-thrower needs to be excluded in order to preserve the entitlement of, and reduce the risks to, the majority. Teachers have a legal duty of care to those who may be affected by their actions – or their inaction (including a failure to deal with the risks from a disturbed pupil).

Most schools these days have quite detailed schemes of work, outlining the activities that are intended to take place. Such a scheme can be used as a tool to identify those lessons where problems will arise due to the presence of a severely disturbed pupil. There are probably rather fewer such lessons than you might think. How often do you really use Bunsen burners? Of course, the mere presence of such a pupil in a laboratory can present problems – turning on gas taps, throwing tripods around. Perhaps it might be possible to identify some laboratories as more suitable than others, for example because the gas can be turned off centrally or because tripods can be locked away.

Using its scheme of work, a school should be able to identify the high-risk activities. These are likely to include the use of some chemicals, but not all, as many – at the dilution used in schools – present minimal hazard. Some microbiology activities present as great or greater risk. So would the use of scalpels. Probably, only a relatively small proportion of lessons will involve high-risk activities but the science department then needs to agree its strategies for dealing with these problems. These might include:

- abandoning the activity;
- excluding particular children from the activity;
- having an extra member of staff present for that activity;
- team teaching – putting two classes together with two teachers.

Teachers may be sceptical about the chances of getting an extra member of staff, even for a few lessons. However, a statemented pupil with SEN should have some support provision within the statement. There is no reason why that provision should not be more flexibly used than is sometimes the case. Often enough, there is support for one lesson in three, perhaps the wrong lesson in the sense that there may be little for the support staff to do because of the nature of the lesson. Instead a department might identify that some topics are inherently more dangerous than others, for example work on the extraction of metals and the reactivity series is likely to involve more hazardous practical work than a topic on electricity. The science department might consider bidding for full-time support for a six-week topic, and no support in the next one. The department might even consider bidding for support just for particular lessons. Currently, most schools have rather rigid systems for allocating support staff time, but need it be so rigid?

Staff

The risk assessment needs to consider the inherent hazards of any chemicals or equipment used, any hazards in the procedures followed and any increased risk resulting for pupils with special needs. In addition, however, it needs to consider whether the risk may be greater because of the staff involved. In a mainstream school some teachers may be much better able to control the behaviour of disturbed pupils than others. Their classes will be able to do more adventurous practical work than others. Is it fair (to staff or pupils) to ask newly qualified teachers to take on classes with pupils with special needs, when there are more experienced teachers available?

An added hazard arises in some special schools: the staff teaching science may not have a science background. Non-specialists may be simply unaware of the hazards. Of course this is often true of those teaching science in primary schools. In primary schools, however, the science curriculum is quite restricted. Hazards are few and guidance is available in one, simple booklet, *Be safe!* (ASE, 1990, 1996). In contrast, in secondary schools there is a wide range of advice available, reflecting the much greater complexity of the curriculum and the much greater use of materials, organisms, equipment and procedures which present hazards. *Safeguards in the school laboratory* (ASE, 1996) is the most straightforward guidance for those with little science background and it is strongly recommended that this is read and its advice followed. Employers are legally required (under the Management of Health and Safety at Work Regulations 1992) to assess the health and safety competencies of anyone they appoint to a post and to provide adequate training when appointed and if the nature of the job changes. Some employers do provide such training, for example by sending staff on the management of safety courses run by bodies such as ASE, CLEAPSS and SSERC. But where there has been little appropriate training, non-specialist staff in special schools might be better advised to follow guidance in *Be safe!* and confine their work to low-hazard contexts. This may of course

impair the pupils' access to the full science curriculum. Where there are specialist science staff available, it is important that they fully brief any support staff present about health and safety matters. For example, if the pupils need to wear eye protection, so do the teacher and any helpers.

Reference

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