

Guidelines for excellence in school science accommodation

July 2008

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The RSC has, for some years, been concerned that a lack of good laboratory facilities and sufficient modern equipment in schools may be factors which are discouraging young people from pursuing the study of science. These factors may also be discouraging graduates from taking up a career in teaching. In 2004, we commissioned CLEAPSS* to produce a report, *Laboratories, Resources and Budgets*, which concluded at the time that: “when pupils are in a science laboratory their experience is unsafe, unsatisfactory or uninspiring for 65% of the time”.

A follow-up report in 2006, *Improving School Laboratories?*, looked into staff satisfaction with the rebuilt or refurbished science facilities in their schools. Despite an expectation that the quality of the labs and the teaching opportunities offered would be a significant improvement, 28% of respondents described the quality of the building works, furniture and fittings as unsatisfactory or poor. 13% expressed a lack of satisfaction with the range of teaching and learning styles which were possible in the new facilities.

The Government recently announced that: “Ministers want lessons to be more exciting for budding scientists” and “...students must be able to experience the excitement of practical experiments“

Schools Minister, 2008

The Government’s programme *Building Schools for the Future*, allied to other school developments, means that most schools are or will rebuild or refurbish their science accommodation. Evidence, such as that given above and other anecdotal reports, suggests that newly built or refurbished science facilities may not always meet the standard and quality that will address our concerns.

There is plenty of excellent, and freely available, advice on building for high quality secondary school science. However, it would appear that this advice is often not consulted; leading to newly built or rebuilt science accommodation which is not fit for the purpose of supporting teachers to provide a high quality practical science education for all their pupils. The RSC has produced this charter of key principles to inform managers in school science departments and encourage school heads, governors, and others to provide, and insist on, high quality science accommodation. If followed, that is what these principals will achieve. If a school chooses not to follow all of them then compromises in that quality will be inevitable.

* CLEAPSS(r) is an advisory service actively supporting practical science and technology in schools and colleges. Currently membership includes all 180 education authorities in England, Wales, Northern Ireland and the various islands, the majority of independent schools, post-16 colleges and teacher-training establishments, many curriculum developers, field study centres, hands-on museums, and over 250 schools overseas.

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Recommendations

Ensure an effective design and consultation process takes place. It is essential, from the outset, to consult recognised and approved guidance on the design of school laboratory facilities. Those responsible for authorising plans should take steps to ensure that this guidance has been taken into consideration, and any deviations from the guidelines fully justified. Science staff, including technicians, should be consulted at every stage of the design and building process - especially if deviations from the published plans are deemed necessary (e.g. for reasons of cost). Innovative designs are to be encouraged but only if the resultant accommodation is still fit for the purpose of enabling quality, hands-on practical work across the sciences. Published guidance, freely available, is listed in Appendix A.

Ensure the appropriate number and size of laboratories, preparation rooms and storage spaces are planned from the outset. Simple formulae are available which take account of factors such as: number of timetabled science lessons per week, time required to service laboratories (i.e. deliver and clear equipment and chemicals etc) and the number of pupils taught in different year groups etc. Adequate and secure storage should be provided for equipment, materials and chemicals as well as students' bags and coats etc. See Appendix A.

Ensure the designs, layouts and materials used in construction are robust and fit for the purpose. Whilst subject-specific laboratories might be preferred in some situations, multipurpose laboratories may offer more flexibility. However, *any* school laboratory provision should be capable of meeting the demands of *all* science subjects in terms of: floor space, layout, laboratory furniture and fittings, IT requirements, ventilation, storage, security, and safety:

Space - *any* school laboratory should be designed to accommodate at least one teacher and 30 students, working as 15 pairs, simultaneously engaging in high quality, hands-on, practical work.

Layouts - should permit a wide range of teaching and learning approaches, including direct teaching and the use of IT resources, as well as facilitating good classroom management and discipline. Designers should draw on features of laboratories that have already proved sufficiently flexible to meet the demands of changing curricula and fashions in pedagogical approaches.

Provision should be made for accessibility for students or staff with special needs.

Laboratory fixtures and fittings - should be sufficiently robust to cope with the demands of frequent, high quality practical work, such as is practiced in UK schools. Advice is freely available on laboratory fixtures and fittings that are known to have stood the test of time.

Environment – should be conducive to learning. Account should be taken of the more demanding requirements (e.g. temperature, ventilation & light) of laboratories and prep rooms compared to classrooms.

Safety and security – should be integral in all designs and plans for laboratories, preparation rooms and storage spaces. Fume cupboards (vented not mobile) should be provided in preparation rooms as well as in laboratories. Mobile fume cupboards could be considered additional extras, not alternatives for fixed, vented versions.

Design demands - adequate funding should continue to be available for appropriate levels of technician and IT support, maintenance and cleaning.

Recent experiences in schools

The following is an illustrative selection of comments from a survey of schools that have recently been rebuilt or refurbished.

“It’s early days but we are generally pleased. Both labs were done as a horseshoe with a smaller bench in the middle.... The only disappointment has been the fume cupboards. We have always had 2 fixed fume cupboards in each room but were talked into having one portable fume cupboard. It is rubbish. Every time you want to use it you have to wheel it out, plug it in, plumb it in, connect the gas and the drainage pipe. The worst thing is connecting the drainage pipe which is full of hazardous materials...”

“we have just had a new lab built. Showed the architect our ideal design – a lab already in existence that they just had to copy – it’s a disaster. They put the services down the middle underneath the bench... the cupboards are not deep enough for a tray... Just shows that no matter what you want you will get whatever the builders need to give you to get the cheapest result”

We had two new labs 3 years ago they have been very good and still remain in good condition. I was consulted at all times... My only grumble is that the powers that be decided they could save money and ordered cheaper benches and stools.. this results in wobbly tables of different heights...”

“Our build cost 3 million for 11 labs and 3 prep rooms. We were consulted. The problems are caused by clever technology that we did not ask for and probably cost a lot of money. Windows that open and shut but not when you want them to. Technology is also affected by the Van De Graaff, it operates the lights and windows in the room and the one below...”

“We have cupboard doors falling off their hinges and cracked surfaces after 6 months (the firm had gone bust since the build so no come back)”

I found the architects and business manager did not listen to our advice ... the stools, for example, are dropping to bits, the swan neck taps have been twisted round and some have fractured the pipes causing flooding, and we haven’t been here a year yet!”

“No fume cupboard in the prep room. It means some experiments have to be prepared in the middle of the classroom in the only working fume cupboard”

“The planners had left out the chemical and radioactive store, this had to be designed in at the last stag....This cost about £15,000 (to put right)..”

The room is divided into a teaching (dry) end with all the relevant apparatus. The lab end is by the prep room and has all lab tables, sinks electricity, gas etc. This set-up allows the technicians to quietly set up a practical even if the class is in the room.”

“Last year we had four labs refurbished.... Pods were not adequately fastened to the floor so we soon had gas leaks.... We asked for *Gratnell* racking but got a cheap substitute with flimsy trays and non-adjustable spacing... Smart boards have been fitted throughout,..in one case the projector was placed to shine directly in to the teacher’s eyes.”

“no black out curtains for light experiments- anywhere. Nowhere for student bags. Too many wall-mounted cupboards above benches – and they’re so low that experiments involving Bunsen burners can’t be done.”

References

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Appendix A

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