

Technicians and their jobs

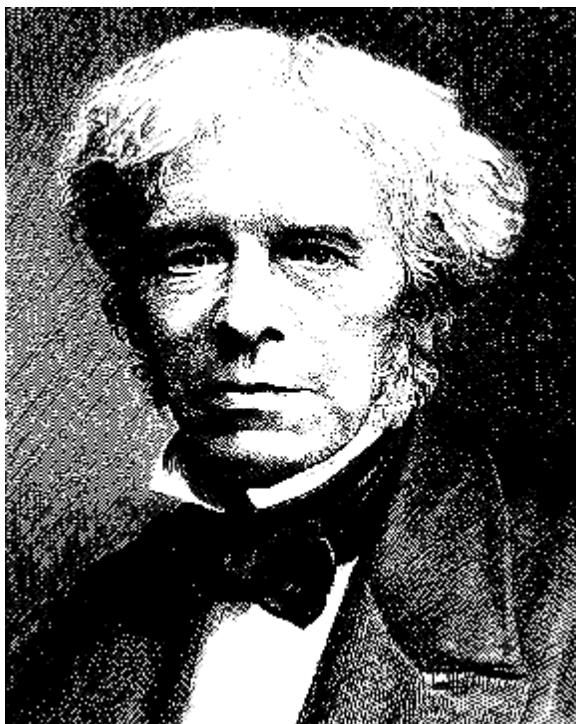
G228

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Technicians and their jobs



Michael Faraday (1791-1867)

*Born on 22nd September 1791, Faraday read many books and became fascinated by science whilst working as an apprentice bookbinder. He wrote to Sir Humphry Davy at the Royal Institution asking for a job. On 1st March 1813 he was appointed **laboratory assistant** at the Royal Institution. There he immersed himself in the study of chemistry becoming a skilled analytical chemist.*

CLEAPSS

Supporting practical science & technology

-in schools and colleges

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Endorsements

"This new guide is an important development for school technicians. A proper career structure will help develop a well-trained, professional technician workforce, which will support teachers in their drive to raise the quality of science education and make it more exciting and appealing to young people. Science technicians have a key role to play in our school laboratories and science curriculum and I hope this CLEAPSS guide helps to raise their profile."

Margaret Hodge MBE, MP
Minister of State for Lifelong Learning and Higher Education

"Technicians are a vital part of any science department and are highly valued by staff and students. But the essential contribution that technicians make to science education has not, until now, been widely recognised outside the science department. This CLEAPSS Guide gives a clear message to managers in schools and colleges, to LEAs and to government that it is time for change. And it cannot come too soon."

Dr Ian Gibson MP
Chair; House of Commons Select Committee on Science and Technology

"Technicians are clearly essential to high-quality science education in this country. Yet, despite their vital role, for many years the contribution and professionalism of technicians have gone unrecognised outside school science departments. Fortunately, things now seem to be changing. Following the Royal Society / ASE reports on technicians' working conditions, others have added their support - particularly Sir Gareth Robert's review team and the House of Commons Science & Technology Committee. This publication from CLEAPSS is a significant progression of the work and builds on its long-standing commitment to technicians and practical science. It offers realistic and pragmatic advice on the role of technicians in schools and is required reading for anyone who cares about the quality of science education in this country. I look forward to the Royal Society working in partnership with CLEAPSS to ensure that the recommendations of this comprehensive guide are progressed."

Sir Alistair MacFarlane CBE, FRS, FREng
Chairman, Royal Society Education Committee

Contents

1.	The scope of this guide	1
1.1	Introduction	1
1.2	Sources of information	1
1.3	Why this guide is necessary	1
1.4	The need for technicians	3
1.5	How to remedy technician inconsistencies	4
2.	What technicians do.....	6
2.1	Who knows what technicians do?	6
2.2	The role of science technicians	6
2.3	Technician activities	7
2.4	Promoting what technicians do.....	12
3.	How many technicians are needed in a science department?	13
3.1	Historical recommendations	13
3.2	Current levels of technician provision.....	13
3.3	Problems with current levels.....	14
3.4	How to calculate the number of technicians needed	15
3.5	Stating the case for levels of technician support	18
4.	Technician deployment and grades.....	19
4.1	Deployment of technicians	19
4.2	Grades of technicians	20
4.3	Line management of technicians	26
5.	Pay	27
5.1	The current situation	27
5.2	Problems with current pay	27
5.3	How much should technicians be paid?	28
5.4	Financial implications	29
6.	Job descriptions.....	31
6.1	The current position.....	31
6.2	Problems with the current position	31
6.3	What should be in science technicians' job descriptions?	31
6.4	Producing a job description	33
6.5	Core job descriptions.....	33
6.6	Any other duties that may be requested	38
6.7	Single-status job evaluation	39
7.	Training, skills, qualifications and experience	41
7.1	The current position.....	41
7.2	Problems with the current position	42
7.3	What is required?	43
7.4	Where and how to obtain training and qualifications	45
7.5	Induction	47
7.6	Funding for training.....	47
8.	Working conditions	48
8.1	The current position.....	48
8.2	Problems with the current position	48
8.3	What working conditions should science technicians have?	49
8.4	Status	51
9.	Recruitment.....	53
9.1	The current position.....	53
9.2	Problems with the current position	53
9.3	How to recruit science technicians	53
9.4	Temporary technicians	55
9.5	Starting the job	56

Guide G228

Technicians and their jobs

1. The scope of this guide

1.1 Introduction

This guide has been written to help promote a professional technician service in schools and colleges. By adopting the recommendations contained in this guide, schools and colleges will not only help to promote the technician service, they will also reap the rewards of improved science education opportunities for their students. It is intended for use in all schools and colleges where technicians are employed. It is mainly aimed at science technicians but may also be of value in design & technology departments and other departments where there are technicians.

How to use this guide

In each section of this guide, the current position regarding technicians is explained and the possible problems encountered are explored. The guide offers advice and suggests ways that some problems may be overcome.

Technicians, science departments, managers and employers can use this guide, in its entirety or in selected sections, to support the case for improved technician provision in conjunction with Guide 258, *Improving Technicians Conditions*

1.2 Sources of information

In July 2001, the Royal Society and the Association for Science Education published the results of a national survey of science technicians in schools and colleges¹. In addition, they sought further evidence from heads of sciences and Ofsted inspection reports. In January 2002, The RS / ASE produced a further report containing conclusions and recommendations².

(Both publications are available from: The Education Unit, The Royal Society, 6 Carlton House Terrace, London SW1 5AG, or from: The Association for Science Education, College Lane, Hatfield AL10 9AA.)

The CLEAPSS *Helpline* has received increasing numbers of enquiries from technicians, teachers, science advisers and others, regarding technicians' conditions of service, pay, grades, training, job descriptions, duties and status. As part of the research for this guide, CLEAPSS carried out its own survey of technicians in 2001 / 2002, in order to explore further some of the conclusions from the RS / ASE reports. CLEAPSS also spoke to, and sought advice from, various technician groups, science teachers, science advisers & inspectors and other science education professionals and visited a number of schools and colleges.

The information from these sources, together with government and Ofsted announcements, anecdotal evidence and the experience and expertise of CLEAPSS staff, were used in the production of this guide.

¹ *Survey of science technicians in schools and colleges*, RS / ASE, July 2001, ISBN 0854035664.

² *Supporting success: Science technicians in schools and colleges*, RS / ASE, January 2002, ISBN 0854035710.

1.3 Why this guide is necessary

It has become apparent that many aspects of science technicians' jobs can vary considerably from school to school.

In some schools and colleges, it appears that the science technicians are highly regarded as valuable members of the staff, not only by the science department, but also by the rest of the school or college. Some examples of good practice in some establishments are listed below.

- *Technicians are involved in departmental decision making through regular attendance at meetings.*
- *Technicians have regular opportunities to attend short courses to update their skills.*
- *The number of technician hours is calculated using recommended formulae, taking into consideration the requirements of the science curriculum and not purely on financial grounds.*
- *The technicians in these 'good-example' establishments often have up-to-date and relevant job descriptions and are paid at a level that reflects their skills and experience and the extra contributions that they make outside the prep room. These include, for example, advice and guidance given to NQTs, new science teachers and science teachers working outside their subject specialisms, on health & safety and practical aspects of the curriculum.*
- *In one establishment visited by CLEAPSS, it was discovered that when a new head teacher arrived at the school, he recognised the importance of the science technicians and increased the number of technician hours and the technicians' pay to reflect the level of support given to the science department.*

Unfortunately these 'good examples' are more often the exception rather than the rule. The conclusions from the RS / ASE survey were that working conditions and the perception of the work of technicians can vary considerably from school to school and LA to LA.

Until recently, technicians generally have been isolated from those in other schools and colleges and have therefore been unaware of others' working conditions, pay, grades etc. However, technicians have now begun to appreciate the inconsistencies in their jobs, as a result of increasing contact with other technicians through meetings, user groups, informal contacts whilst attending short courses, CLEAPSS advice and guidance on technicians and their jobs, the ASE and Scitech¹ technician discussion groups.

Some technicians and science departments are frustrated that they are sometimes regarded less well than colleagues in other schools and colleges. They sometimes feel undervalued and may complain that, outside the science department, colleagues do not know what they do. They often feel that the rest of the school community sees them as 'washers up' and 'helpers' for the science teachers. Science departments know that technicians can make a unique contribution to the learning opportunities available to students, but technicians often feel that their contributions are not recognised by the school as a whole. Technicians are sometimes dissatisfied for the following reasons.

- *Their job descriptions vary considerably from LA to LA and even in schools within the same LA. Independent schools often draft their own job descriptions. Sometimes it appears that non-science staff who do not know the requirements of the job have written job descriptions.*
- *They often state that they have no formal performance management or appraisal schemes implemented to assess their training needs. They also have limited opportunity for training and little access to short courses, to update their skills.*

¹ Scitech is an e-mail discussion group for science technicians. This is a free service for technicians to share ideas and feel less isolated. To join the group, send a letter on school headed paper stating the name and e-mail address of the intended subscriber to: Robin & Maz, 1 Chaucer Street, Hull, HU8 8NA.

- *Often there is inconsistency in the resourcing levels of technicians. Some schools and colleges have ignored the various formulae that have been recommended to calculate the number of technicians required to deliver an adequate technical service to meet educational and curriculum demands (see section 3). Instead, senior managers have sometimes reduced the level of technical support in science departments, purely as an easy option to save money in the school's overall budget without any regard for the damaging effects of this reduction.*
- *As well as inconsistencies in the number of technicians in schools and colleges, their grades and pay structures often vary from school to school and LA to LA. Technicians are often part time and/or term time only and they sometimes feel that they are on the 'bottom of the heap' within the school staff. They often feel that other school support staff, in particular those who come into contact with all teaching staff and especially senior management, (eg, administration and ICT staff), are more highly regarded than themselves, despite the considerable specialist knowledge, experience and health & safety responsibilities that are part of their everyday duties. They feel that this has led to the assumption that being a science technician is a dead-end job instead of a professional occupation.*
- *With the varying job descriptions, pay and grade structures, technicians often state that there is little scope for career progression. In many professions, eg, teaching, after obtaining experience and qualifications, there is an opportunity for gaining promotion. This is difficult for technicians and is further exacerbated by the current lack of a recognised national medium for publicising technician vacancies. (See Section 9.3.)*

1.4 The need for technicians

Science technicians have an essential role to play in current and future science education. They have considerable skill and expertise not available anywhere else. Trained and experienced technicians have a detailed knowledge of practical techniques and often greater expertise (than do the science teachers) in matters of technique, health & safety, efficiency and economy.

Experienced and skilled technicians can give direct support to practical activities, offering technical advice to students and staff, and rectifying problems. They can have an effect on the resources used by the department by ensuring that a wide range of apparatus and materials is available, appropriately maintained and stored effectively.

Technicians not only contribute to the health & safety, economy and efficiency of the department, but they also enable teachers to offer varied and stimulating science lessons. Recently, there has been much discussion about reducing the workloads of teachers by increasing the role of teacher assistants. Whilst technicians should *not* be used instead of teacher assistants, their support can help to make science teachers workloads more manageable. Inadequate levels of technician support can often be linked to underachieving science departments.

The report of the House of Commons' Science and Technology Committee¹ states that: *"Technicians have a vital role to play in providing high quality science education."*

Why should we use science practical investigations?

The DfES/QCA² has stated that: *"Scientific method is about developing and evaluating explanations through experimental evidence and modelling. This is a spur to critical and creative thought."* This view is echoed by the House of Lords' Select Committee on Science and Technology³, which states: *"Practical work catches the imagination of the young and can excite them about science from an early age."* A recent study of pupils' views on the school science

¹ Science Education from 14 to 19, Third Report of Session 2001-02, Volume 1, *Report and Proceedings of the Committee*, The Stationery Office, ISBN 0215004248.

² *The National Curriculum*, 1999, Handbook for secondary teachers in England and Wales, The Stationery Office, ISBN 0113700679.

³ *Science in Schools*, 2001, first report, The Stationery Office, ISBN 0104050012.

curriculum¹ confirms the opinion of science teachers that *“Pupils expressed a greater interest in work that included opportunities for experimentation and investigation.”* The report of the House of Commons’ Science and Technology Committee² states: *“In our view, practical work including fieldwork is a vital part of science education. It helps students to develop their understanding of science, appreciate that science is based on evidence and acquire hands-on skills that are essential if students are to progress in science. Students should be given the opportunity to do exciting and varied experimental and investigative work.”*

What some heads of science say

- *“Grades improved due to more exciting practicals. Pupils were more engaged with the work and there were less behavioural problems.”*
- *“The technicians are essential for the smooth running of the department. They ensure that all the equipment is maintained and ready for use, enabling teachers to concentrate on teaching.”*
- *“Results have dramatically improved because of an increase in technician hours and the work technicians do in terms of support on field trips, project work etc. This has also reduced stress levels of teaching staff which allows for better teaching and hence achievement.”*

Practical work and science technicians

It is clear that practical work is essential in the development of scientific understanding for school and college students, can increase their interest in science and can contribute to improved examination results. Technicians have a key role to play, enabling teachers to teach exciting and varied practicals in an efficient and safe environment.

In the report by Sir Gareth Roberts³ it is stated that: *“Pupils’ learning experiences are influenced not just by the teacher but also by the environment in which the subjects are taught.”* The report identifies three factors as particularly important.

- *The quality of the laboratory and associated scientific and technical equipment.*
- *The support provided by laboratory technicians.*
- *The support and guidance that pupils have in carrying out practical work (with particular reference to the adverse effect of high pupil-to-teacher ratios).*

Technicians contribute to all three of these factors by providing and caring for laboratories & equipment and for the advice and guidance they give to teachers and pupils.

Ofsted, in its reports of school inspections, has consistently commented on inadequacies in the number of technicians, but has invariably made positive comments about the high quality of the technicians.

What some Ofsted inspection reports say

- *“These people (technicians) work under very difficult conditions yet always have the apparatus and equipment ready for lessons as if by magic, clear it away afterwards... but the quality of teaching and learning would be improved if there were more laboratory technicians.”*
- *“There has been some improvement since the last inspection, but the quality of teaching and learning would be improved if there were more laboratory technicians.”*

¹ *Pupils’ and parents’ views of the school curriculum*, Osborne J, & Collins S, King’s College, 2000.

² Science Education from 14 to 19, Third Report of Session 2001-02, Volume 1, *Report and Proceedings of the Committee*, The Stationery Office, ISBN 0215004248.

³ *Set for success*, The supply of people with science, technology, engineering and mathematics skills, Sir Gareth Roberts, April 2002.

1.5 How to remedy technician inconsistencies

The RS / ASE report recommends that:

- *there should be a national framework for technicians' pay and job descriptions;*
- *a common formula should be adopted to determine the number of technician hours that schools need;*
- *technician training should be properly funded;*
- *there should be a nationally-recognised induction programme;*
- *there should be a recognised career structure;*
- *heads of science and governors should look at the way technicians are managed.*

This guide offers advice on matters relating to technicians and their jobs. It can be used to address some of the issues raised by the RS / ASE survey, for technicians, science departments and schools, by giving examples of the good practices and conditions that technicians already experience in some schools and colleges. It contains advice on how the recommendations from the RS / ASE report may be implemented. However, technicians, heads of science, science advisers, Ofsted inspectors and others who are aware of the value of science technicians, should actively promote, to all personnel in schools (including managers), how technicians have a vital role to play in the opportunities available for students to study and learn science more effectively.

CLEAPSS recommendation

CLEAPSS recommends that schools and colleges, including managers, governors and employers, recognise the need for a high-quality science technician service to support the science curriculum offered to students.

2. What technicians do

2.1 Who knows what technicians do?

Technicians often complain that the management and staff (with the exception of those in the science department) in the establishments where they work, sometimes have very little knowledge of what they do.

A significant amount of science technicians' working time is spent in the prep room. Often the only school staff, other than technicians, who go into the prep room are the science teachers. Colleagues from other departments may only see the technicians occasionally in the staff room (if they have time for breaks), or at the photocopier where they may be perceived as *general helpers to the science department who are lucky to have them to do the departmental photocopying*. Technicians' roles can therefore sometimes be misunderstood. Colleagues outside the science department, including managers and governors, sometimes wrongly see technicians as departmental administration assistants and/or classroom assistants with the additional task of washing glassware.

2.2 The role of science technicians

Science technicians' roles can vary considerably from school to school. In general terms, however, science technicians support the practical and technical aspects of the science curriculum by preparing, providing, maintaining, organising and managing the resources required for healthy, safe and secure, exciting practical activities to be carried out by staff and students.

Technicians and classroom assistants

The Government has announced that resources are to be made available for extra support staff (including technicians and classroom assistants) to work with teachers to give them more time to prepare lessons, train and think¹. This means that classroom assistants can support teachers by doing some of their administration work and photocopying etc, as well as supporting pupils/students in the classroom. It must be stressed that science teachers need this added support just as much as other departments in the school.

CLEAPSS recommendation

Technicians should not be used instead of general classroom assistants in science lessons. Technicians may be required to support pupils / students in the classroom but their role is different to that of classroom assistants in that they support practical science teaching with their specialist experience, knowledge and skills in health & safety as well as the practical aspects of the science curriculum. They should not be used to help carry out routine administration work.

'Grey-area' tasks

It is easy to recognise that making up solutions, providing science apparatus etc, is the job of a science technician. It is also obvious that standing in front of a class of students giving a theory science lesson, is a teacher's job. However, there are many grey areas in between those two extremes where staff are sometimes not sure whose job it is to tackle a particular task. Technicians are sometimes asked to do tasks that they may not consider to be a part of their

¹ *Developing the role of school support staff, The Consultation, 2002, DfES, ref: DfES/0751/2002, PPD16/1002/53.*

jobs. In some establishments, technicians are responsible for the departmental photocopying, issuing and checking textbooks etc. CLEAPSS believes that technicians' work should be of a technical nature and technicians should not be used as general science department helpers. They should provide *technical* support for the teaching of practical science.

In some schools and colleges, technicians are asked to help in practical classes and/or with demonstrations. Many technicians view this as a rewarding part of their jobs and are quite happy for this to continue, while others do not see it as part of their role in the establishment. Many schools in the future will, however, want to develop this role for their technicians.

If schools would like their technicians to help in the laboratory and/or perform non-technical tasks, then they must carefully consider the number of extra technician hours that will be required due to the increased workload. They must also consider the issue of technicians' pay.

As a useful rule of thumb in assessing a grey-area task, one should ask the question: "Is this something that other departments without technicians have to do?". If the answer is yes, then strictly speaking it should not be the task of a technician. If it is thought that it should be, then every department in the school would have a case for technician support.

The exception to this rule of thumb is that of ordering, stock control and financial requirements, where the most senior technician usually has responsibility for these. The science department is different in this respect to other non-practical departments because it has a large and constant need for equipment and materials to be checked and replenished. Some other practically-based departments in schools (eg, technology, art) may have similar requirements, but these can be less than for science and those departments often also have technicians to help deliver the practical aspects of their curriculum.

In many schools it has become established practice that the science department technicians should carry out non-technical activities. This practice does not necessarily have to be discontinued, but the department should be aware that the extra duties carried out by the technicians are essentially goodwill gestures and that such duties should have low priority.

CLEAPSS recommendation

Technicians' first priorities should be to arrange for the provision and clearing of practicals and the health & safety of the technician service. Any extra tasks of a non-technical nature should only be carried out if there is sufficient additional technician time available. They should **not** be carried out if to do so would have an adverse effect on the ability of technicians to provide efficient, healthy and safe support for practical science classes.

2.3 Technician activities

Many of the science technician activities below require specialist knowledge (including health & safety) and some demand a considerable amount of time. As well as increasing the efficiency of the science department, some of the activities can create significant financial savings. Technicians also contribute to students' education by saving teachers time so that the teachers can concentrate on the delivery of the curriculum.

If a department has no science technicians, or if technician provision is inadequate, some essential tasks will not be carried out and others receive only minimal attention. This could cause serious health & safety risks and could adversely affect the quality and range of practicals offered to students.

Those activities carried out regularly by most technicians

Making up solutions

This could involve making bulk quantities of stock solutions, multiple sets of many different solutions (which can sometimes take a technician more than half a day for one practical lesson), diluting concentrated solutions and making accurately-known concentrations. All these require skill, expertise and a detailed knowledge of health & safety.

Assembling apparatus

This can range from setting up, for example, simple springs and masses in a stand, boss and clamp, to setting up more complicated demonstrations, (eg, discharge tubes) or chemistry steam distillation equipment. These need expertise and knowledge and may require the technicians to organise their work in conjunction with the availability of laboratories. Assembling apparatus may require a considerable amount of time and the full attention of a technician if mistakes or accidents are to be avoided.

Delivering equipment to rooms

This may involve moving large trays or trolleys of equipment and materials and often requires multiple journeys to and from laboratories. It requires technicians to organise their work so that the movement of equipment can take place during times when corridors etc are not filled with students and staff. It also requires that manual handling risk assessments are carried out. The delivery of equipment to rooms may take place several times a day and involve several different laboratories, often on more than one floor of the building and sometimes across playgrounds to other buildings.

Collecting, checking and returning equipment to stores

If technicians are not able to perform this task, then materials and equipment may deteriorate and could lead to poor-quality and unsuccessful practicals. Frequent manual handling risk assessments are also required.

Disposing of waste materials

This will involve knowledge of local requirements, checking regulations & guidelines and for arranging that special waste is packaged and collected. It may also require waste to be treated before disposal.

Taking care of laboratory equipment and apparatus

Technicians need to keep equipment and apparatus in good repair so that when it is used, it is safe and works well in practical lessons. Equipment needs to be properly organised and stored safely and efficiently. The consequence of this not being done properly is the deterioration of the equipment, which soon falls into a bad state of repair, and students could be 'turned off' science by ineffective practicals. Technicians need to monitor the use of resources and plan ahead so that the correct materials for the department are available in the correct place for practical classes to function efficiently. Such resources may also include paper and electronic items, for which technicians can play a key role in their organisation, cataloguing and distribution. Systems may need to be set up involving colour coding and storage of resources, the preparation of databases and spreadsheets, etc.

Carrying out and arranging for maintenance and repair of equipment

Technicians can spend a significant amount of time repairing equipment. This will save the department money. Where equipment needs to be sent away for repair, the technicians will obtain estimates and arrange for economic repairs to be carried out.

Stocktaking chemicals and/or equipment

A chemicals stocklist is particularly important so that chemicals which are no longer used can be disposed of and those in use are available in appropriate quantities. Schools can have several hundred different chemicals and keeping up-to-date stocklists may involve using ICT to set up databases which could take a considerable amount of time and expertise. The same can apply to the wide variety of equipment and materials kept by science departments.

Obtaining materials by local purchase

Some materials need to be obtained fresh and some may not be available from the usual education suppliers. These need to be obtained locally by the technicians. Depending on a schools' location, obtaining materials by local purchase may require a significant amount of technician time, but may enhance the learning of students by enabling them to have fresh materials for experiments.

Placing orders and checking deliveries or invoices

Some of this may be routine. Some orders, however, may involve technicians in detailed research, often using ICT and testing of equipment, in order to obtain the most suitable and economic resources for the department.

Those activities carried out often by many technicians

Constructing and modifying apparatus

Technicians may sometimes modify apparatus or an experiment so that 'it works better' or more safely. For experiments that appear in scientific journals or that teachers 'dream up', a piece of manufactured equipment is often unavailable or very expensive. In these circumstances, technicians often obtain materials and construct, test & modify equipment. Technicians may also construct equipment that is available commercially, but at a fraction of the normal cost and hence save the department money.

General laboratory cleaning

Technicians keep laboratories tidy and clean work surfaces to remove any chemical or biological contamination, in accordance with health & safety requirements. They clean and tidy away used equipment and wash awkward-shaped equipment by hand. Cleaning some equipment may involve using dishwasher machines.

Cleaning laboratory sinks

Technicians clean laboratory sinks, not only as part of keeping the laboratories clean and tidy, but also to remove any contamination and hazardous materials that could present a health & safety risk. They may be required to empty sink traps or supervise plumbers to do so, because of any chemicals that the traps may contain.

Caring for plants and/or animals

Schools can have large and varied live plant and/or animal collections that need to be cared for. This requires a significant amount of technician time.

Trialing practical activities

From time to time, science departments change the courses that they offer. New courses often contain different and/or unfamiliar practicals. Technicians often trial such experiments, modify them if necessary and advise teachers of their conclusions. This can save teachers time and enable them to be fully prepared for a lesson. Trialing may involve technicians checking whether a wide variety of reactions will work satisfactorily if the concentrations of the reagents are reduced. Using more dilute solutions and smaller quantities is important for health & safety when using hazardous chemicals and will therefore contribute to improved health & safety conditions for staff and students. It will also save the department money. This task is, however, very time consuming.

Assessing risks for technician activities

Almost all technician activities require a risk assessment to be consulted. Technicians need to be aware of the model risk assessments that are available and to be able to obtain special risk assessments where no model ones are available. Because of technicians' expertise in health & safety, they are often called upon, by science teachers and other departments in the school, to help with assessing risks that may not be connected to their normal technician duties.

Photocopying

Many science technicians are asked to do photocopying. Some do all the department's photocopying (see section 2.2). Where this is the case, it can have a considerable saving on teachers' time but may affect the delivery of technical support to the department. In a school, there is often a system to help provide photocopying facilities to individual departments. Where this exists, the science teaching staff should also use it.

Setting up AVA equipment

In some schools, science technicians may be required to do this and in others not (see section 2.2).

Checking textbooks

This may involve issuing, retrieving, checking and storing textbooks. This may be seen as a 'grey-area' task (see section 2.2).

Repairing textbooks

The useful life of books is prolonged where technicians repair them, which in turn will save the department money. However, technicians occupied in this way will not be available to support practical activities in science.

Providing technical assistance to trainee teachers

Experienced technicians can spend a lot of time helping student teachers so that they have positive first experiences of teaching practical science. (See also section 2.4)

Providing technical assistance to newly-qualified teachers (NQTs)

As with student teachers, NQTs can greatly benefit from the technicians' experience and expertise, which can contribute to NQTs starting their science teaching with confidence. (See also section 2.4.)

Providing technical assistance to teachers

Where teachers work outside their subject specialisms or with unfamiliar equipment and/or techniques, the technicians can provide important technical and health & safety advice, even to experienced teachers.

Providing technical assistance to students/pupils

In some schools this role is increasing. Technicians can be invaluable, especially where students are carrying out individual investigations or projects. The assistance may take place informally outside the prep room, or in laboratories where technicians may be required to help in practical classes, assisting or advising students and staff on the practical aspects of the curriculum (see section 2.2). This should not be confused with the role of a classroom assistant; a technician provides invaluable **technical** support. In this way, technicians can provide help to the teacher in organising stimulating and exciting practicals.

Those activities carried out by some technicians

Keeping financial records

This is usually performed by the most senior technician, but may be done by others. It can involve the monitoring and control of the science department budget, keeping records in accordance with the bursar's / finance department's / LA's financial regulations and in liaison with those departments, often using ICT.

Carrying out demonstrations

Technicians' expertise may be used to demonstrate how to use equipment or how to perform a particular technique.

Assisting with field trips

Technicians can be useful here not only as 'additional adults', but also in providing their specialist knowledge of the subject.

Radiation protection supervisor (RPS)

Some technicians have this responsibility for understanding and implementing the *Ionising Radiations Regulations 1999* or *Ionisation Regulations (Northern Ireland) 2000*.

Checking laboratory services and equipment

This may include fume cupboards and/or electrical safety checks that, if carried out by technicians, will save the department money. It will, however, require a considerable amount of time because of the large numbers of electrical equipment in a science department. Other equipment that technicians check includes first-aid kits, pressure vessels, eye protection and Bunsen burner tubing, etc.

Setting up IT equipment

This will usually involve datalogging equipment. Technicians are often more familiar with datalogging hardware and software than the teachers, so their advice can be very important.

Recording off-air

Many technicians record, catalogue and store video and audio programmes. These are important resources for the department.

Laminating, collating and binding

This is a 'grey-area' task (see section 2.2). Where technicians perform this task, it will help save teachers time but at the expense of the technical support that a technician can more usefully provide.

Technician activities outside the science department

In addition, some technicians have the following duties outside the science department. Although valuable to the school as a whole, these may have serious consequences for the quality of the technical support provided in science.

- *Whole-school health & safety support.*
- *Science department risk assessment.*
- *Whole-school risk assessment.*
- *Work in DT departments.*
- *Mid-day supervision.*
- *Whole-school electrical testing.*
- *Whole-school AVA technician.*
- *Whole-school first-aid provision.*
- *School photographer.*

- *Whole-school fire-extinguisher checks.*
- *Gardening.*
- *Enrolling.*
- *Examination invigilation.*

Extra-curricular activities

Some science technicians also take part in the following extra-curricular activities. It would be expected that these will take place in the technician's own free time (or extra hours are made available), so that these activities do not have an adverse effect on their ability to provide a high-quality technical support service to the science department.

- *Music / drama productions.*
- *Sponsored events.*
- *Science clubs.*
- *Activities weeks.*
- *Open days / evenings.*
- *Sports.*
- *Trips / visits.*
- *Presentation evenings.*

2.4 Promoting what technicians do

Technicians, heads of sciences, science teachers, science advisers and inspectors can all promote the importance of technicians to those who may not appreciate the extent of most technicians' jobs. This could be achieved by circulating a paper to all school staff, (photocopied sections of this guide could be used), stating the roles and the importance of the science technicians to the success of the science department and other areas of the school to which they contribute. Alternatively, the role of technicians could be discussed at a staff meeting at the beginning of the year, at which technicians could (themselves) tell school staff how they contribute to the school community.

CLEAPSS has learned of one school in which NQTs and trainee teachers shadow a science technician as part of their induction. This not only gives the new and trainee teachers an appreciation of what technicians do, but also provides the new staff with some training in good practice and techniques and gives them an awareness of departmental procedures.

Technicians can promote themselves by using staff rooms and talking to non-science staff about their jobs.

CLEAPSS recommendation

School staff, senior managers and employers should be made aware of the varied and complex roles of technicians and how they contribute to the success of a school. Technicians should be invited to staff functions and should attend science department and whole-school staff meetings so that they can actively contribute to decision-making processes, and be seen by the whole staff to do so.

3. How many technicians are needed in a science department?

3.1 Historical recommendations

Over the last fifteen years or so, there have been a number of formulae suggested for calculating the optimum technician provision. Pre-Ofsted HMI suggested that there was serious under-provision if there was less than one technician per three laboratories. In the now-abolished Inner London Education Authority, in the 1970s and early 1980s, it was suggested that one technician per two laboratories should be used in calculating technician provision.

In 1990, the ASE¹ suggested linking the number of periods of science per week, or the total hours of science taught per week, to the number of technician hours required per week. It suggested that:

$$\text{technician hours per week} = \text{total science teaching hours} \times 0.85.$$

The figure of 0.85 is known as the service factor. This figure was recommended by the ASE to ensure adequate technical support for the science curriculum.

The ASE also stated the quality of the technician support that could be expected for different service factors, as in Table 1.

Table 1 Quality of technician support for different service factors¹

Service factor	Quality of technician support
0.85	This is the recommended allocation of technician support to science teaching for a compact suite of laboratories with adjoining preparation and storage space. All functions are feasible, including access to training and the development of opportunities to meet a school's changing needs.
0.75	At this level of allocation, provision of the full range of functions will depend upon recruiting well-qualified and experienced technicians. Where the full range is possible there will be a need to prioritise functions and decide on the emphasis of support required. It may still be possible to achieve a balance between resource-related, design & development and direct support activities.
0.60	It will not be possible to deliver all functions adequately and a restricted range of priorities will need to be identified. Efficient management of resources and administration are likely to be affected and activities related to the design & development of practical programmes and direct support will be in jeopardy. Functions possible may well depend on the skills and experience available and a policy for training will be essential if an effective service is to be maintained.
0.45	Functions will be markedly reduced and in most cases no more than simple, immediate, maintenance and control will be possible. In the long term, efficiency in these will be impaired. The availability and range of resources will become restricted and the development of effective practical programmes is likely to be impaired. A supervisory structure for the less experienced may have to be provided from elsewhere. Regular training will be essential but difficult to provide.

The quality of technician support represented in Table 1 is based on the assumption that technician hours are calculated for a 52 week year and **not** on a term-time only basis.

3.2 Current levels of technician provision

From Table 1 it can be seen that a service factor of 0.85 has been recommended to provide adequate technician support. However, in the Royal Society / ASE survey², it was found that, amongst the schools surveyed, almost all were operating with a service factor below 0.7; see Table 2.

¹ *Technical Support for School Science*, ASE, 1990, ISBN 0863571425.

² *Survey of science technicians in schools and colleges*, RS / ASE, July 2001, ISBN 0854035664.

Table 2 Summary of service factors from RS / ASE survey¹

Types of establishments	Service factor	Comments
Average of all schools	0.5	A significant number of schools were operating with a service factor around 0.35, with some below that figure.
Average of comprehensive schools	0.45	
Average of VI-form colleges	0.6	A few colleges were operating with service factors above 0.8.
Average of FE colleges	0.7	

CLEAPSS carried out a smaller survey, the results of which were very similar to the RS / ASE one. In addition, CLEAPSS discovered that amongst the middle schools surveyed (of those with technicians) the average service factor was 0.4, with many significantly lower. Some middle schools and some independent prep schools had no technical support, even though they taught practical science. In some others, technicians were employed to work throughout the whole school and could not estimate the amount of time that they spent on science activities per week.

3.3 Problems with current levels

It is clear that very few establishments have attained the recommended service factor of 0.85. Almost all establishments seem to have been operating with technician levels below that which has been suggested as adequate to support the science curriculum. Many schools have not used any of the suggested formulae to calculate their technician provision but have instead used the historical situation in their establishments and some have used only financial considerations in order to save on the staffing budget.

In schools where practical science is taught and which have no technical support, (particularly the case in some middle and prep schools), an extra burden is placed on already busy teachers.

The Royal Society and ASE² have recognised that the previously-recommended service factor of 0.85 may have been a little high (see section 3.4). Even so, they have stated that up to 4,000 additional science technicians need to be recruited in order to support school science departments. They have also stated that schools have inadequate technician hours by up to 40%. The report of the House of Commons Science and Technology Committee³ also states: *“schools need to employ an additional 4,000 technicians if science departments are to be properly supported.”*

The shortage of technician hours has also been identified in some Ofsted inspection reports.

What some Ofsted reports have stated

- *“The amount of technical support is insufficient to service high levels of practical work and also to ensure that all health & safety measures are in place.”*
- *“Technical support is excellent, though inadequate to support the extensive range of practical work carried out by the department.”*

This shortage of science technicians, if it is allowed to continue, will have severe consequences for the quality of science education offered to students and will seriously affect technicians' working conditions and job satisfaction.

¹ Survey of science technicians in schools and colleges, RS / ASE, July 2001, ISBN 0854035664.

² Supporting success: Science technicians in schools and colleges, RS / ASE, January 2002, ISBN 0854035710.

³ Science Education from 14 to 19, Third Report of Session 2001-02, Volume 1, Report and Proceedings of the Committee, The Stationery Office, ISBN 0215004248.

3.4 How to calculate the number of technicians needed

In reality it is clear that a service factor of 0.85 has very rarely been attained. Many schools had a lower figure but indicated that they were operating adequately. Recently the ASE¹ has reviewed its position on service factors and now states that a **factor of 0.65 is the minimum necessary to provide adequate technical support in a science department**. However, this is a crude measure, not least because the management and deployment of technicians within a school or college is as important as the number of technicians and these factors can vary considerably.

How to calculate for individual establishments

One way to calculate service factors is to consider the different circumstances in schools and colleges, and so arrive at a more appropriate estimate of an establishments' technician requirements.

If the ASE figure of 0.65 is taken as the minimum required by any science department, then Tables 3 & 4 can be used to analyse the requirements of individual establishments. The figure calculated will help to establish whether a higher service factor is needed.

Individual establishments may need to consider some of the tasks in Table 3 and adjust the weighting points depending on the extent to which some of the tasks are required by science departments and the amount of time spent on the task.

¹ *Supporting success: Science technicians in schools and colleges*, RS / ASE, January 2002, ISBN 0854035710.

Table 3 Points plan for calculating the service factor required for science departments

Science provision in a school or college		Points
Amount of post-16 work as a percentage of all science taught ¹ :	80-100%	5
	50-79%	3
	20-49%	2
	5-19%	1
The science department is on a split site and/or has widely-dispersed science accommodation		5
There is a lack of adequate prep room and/or storage space ²		5
There is no dishwashing machine		5
The following special resources are to be cared for ³ :	Animals	1-5
	Greenhouse	1-5
	pond	1-3
	environmental area	1-3
Level of technical support provided		Points
Individual sets of equipment and chemicals are prepared and delivered by the technicians		5
Technicians prepare stock equipment and solutions for students to help themselves		3
Students help themselves and put away a large proportion of their own equipment		1
The total amount per week that technicians are required to help in labs during lessons and/or with individuals or groups of students:	more than 2 hours	5
	1-2 hours	3
	up to 1 hour	1
Technicians are required to repair and maintain equipment		2
Technicians clean laboratories and equipment regularly		2
Technicians are required to design and construct equipment		2
Technicians are required to carry out tests on:	Portable appliances in science	2
	Portable appliances in other areas of school	2
Technicians write and update departments' risk assessments for technician activities		1
Technicians are required regularly to set up:	Demonstrations	1
	Computers	1
	Dataloggers	1
Technicians are required regularly to set up circuses of experiments		1

The weighting points from Table 3 can be added together to obtain a total. The higher the total, the higher the service factor will need to be.

¹ The weighting points may need to be adjusted with small class sizes which may reduce the workload. (In this case, individual establishments would need to decide if the workload is reduced significantly.)

² DCSF, *Building Bulletin 80, Science Accommodation in Secondary Schools*, 1999, guidance suggests that the amount of space required for preparation rooms and storage should be 0.4-0.5 m² of floor space for each science pupil space. Eg, for a suite of six laboratories each holding 30 pupils, the preparation / storage area should be 6 x 30 x (0.4-0.5) m², ie, 72-90 m², the size of another laboratory.

³ Individual establishments would need to decide the weighting points depending on the size of these tasks, considering the fact that caring for large plant & animal collections, ponds and environmental areas can be very time consuming.

Table 4 gives a suggestion for obtaining service factors from the total number of points for a school or college.

Table 4 Points totals and service factors

Points total	Service factor
44-49	0.90
38-43	0.85
31-37	0.80
24-30	0.75
17-23	0.70
10-16	0.65

0.65 is the minimum service factor that is now recommended to provide adequate support for the science curriculum. If the points total is below 10 it would suggest that the technical support is not being used effectively, with technicians only supplying and collecting equipment & materials and performing no other duties. In this situation, (which may be the case in a few middle schools), it is recommended that the service factor should not fall below 0.5 and that the demands on the technicians should be very basic and limited.

Once the service factor for the department has been decided, the number of technician hours per week can be calculated by multiplying the service factor by the number of hours of science taught per week (based on a 52-week all-year contract of employment).

Technician hours per week = service factor × science hours taught per week

Calculating the service factor where term-time only (TTO) technicians are employed

Where establishments employ all or some of the science technicians on term-time only contracts, the current service factor should be calculated by converting the weekly hours worked to the equivalent for an all-year contract and not using the actual hours worked per week.

Example:

An establishment has two science technicians. One is employed full-time (37 hours per week) and all year (52 weeks). The other is employed for 20 hours per week and for 40 weeks of the year (this is actual weeks worked **plus** any weeks paid holiday entitlement).

Actual hours per year of TTO technician are $20 \times 40 = 800$ hours per year.

Averaged over 52 weeks = 15.4 hours per week.

Therefore, the establishments' technician hours per week (for the calculation of the service factor) will be **$37 + 15.4 = 52.4$ hours**.

If the total number of science hours taught per week in the establishment were 88, then the service factor would be $52.4 / 88$, which would be **0.6**.

This figure would probably be too low and a more appropriate service factor could be calculated by using Tables 3 and 4.

CLEAPSS recommendation

Schools and colleges should have science technician provision with a minimum service factor of 0.65. However, a higher level of provision may be required in many establishments depending on their facilities and the service that technicians are expected to provide. Lower levels will only allow the most basic requirements of the practical curriculum to be met and may severely restrict technical support to the department. Consideration should also be given to the general principle that exciting, stimulating and varied science practical lessons will produce better achievement and that a higher level of technician support will greatly contribute towards it. **All schools where practical science is taught should have some level of technical support.** The service factor should be periodically reviewed and revised to reflect changes in the curriculum, practical requirements and the needs of the department.

3.5 Stating the case for levels of technician support

Technicians and heads of sciences should notify senior managers and employers of the required science technician provision for the department and should urge that suitable numbers of technicians are employed so that the practical requirements of the curriculum and health & safety requirements can be provided for. They should ensure that employers and managers understand that inadequate technical provision will result in many essential tasks being neglected or not performed and that, without increased provision, such duties could not be tackled in the future.

Employers and managers must be made aware of the effect that reduced technical provision will have on the learning opportunities for science students.

CLEAPSS recommendation

Schools and colleges should employ an adequate number of science technicians required for the department. Schools have relatively few science technicians, so to employ the recommended number would represent a very small percentage increase of the staffing budget. This minor increase in costs would, however, have a significant effect on the practical science opportunities available to students and to the efficiency and health & safety of the department. Senior managers should accept that substandard science education could be the result, if they are dismissive about improving technician provision.

4. Technician deployment and grades

4.1 Deployment of technicians

When schools have calculated the number of technicians that they need, a decision on how best to deploy them is required.

How technicians have been deployed

Technicians in schools and colleges have been deployed in a number of different ways to suit how individual establishments operate and the curriculum that they provide.

In the past, technicians were often employed as single-subject specialists to reflect the amount of single subjects that were taught. Nowadays, the way that a significant amount of science teaching is organised requires technicians to be proficient in preparing materials for all sciences. Where this is the case, technicians can be deployed in a number of different ways. They can be responsible for:

- *providing technical support to certain areas of the curriculum;*
- *servicing the work done in certain laboratories;*
- *the practical requirements of certain teaching staff.*

Where there is still a high proportion of science taught in single subjects (for example, in FE and VI-form colleges), technicians are often employed as single-subject specialists.

Subject specialists versus multi-discipline technicians

If technicians work in more than one science area, they are able to schedule their own work so that particularly busy times in certain curriculum areas can be catered for, eg, project work and/or practical assessments. It is also easier to cover for absences of other technicians and to supervise new and/or trainee technicians. A disadvantage is that technicians who are qualified and skilled in one particular science may need time and/or training before they gain the skills and expertise required for other science areas. Consequently, technicians working as subject specialists can fully utilise any special skills and expertise they have in their own area of work, but may not be flexible enough to cover at busy times and for staff absences in other areas.

Factors affecting technician deployment

The way technicians are deployed is as important to the efficiency of the science department as the number of technicians employed.

There is no single way of deploying technicians that is the most effective for all establishments. There are, however, several factors unique to individual institutions that need to be considered when deploying technicians. These are:

- *the number of technicians;*
- *the line management and supervision of technicians (see section 4.3);*
- *the hours that technicians work;*
- *the number and location of laboratories;*
- *the number and location of prep rooms and storage areas;*
- *the size of prep rooms and storage areas¹;*

¹ DCSF guidance in Building Bulletin 80, Science Accommodation in Secondary Schools, 1999, suggests that the amount of space required for preparation rooms and storage should be 0.4-0.5 m² of floor space for each science pupil space. Eg, for a suite of six laboratories each holding 30 pupils, the preparation/storage area should be 6 x 30 x (0.4-0.5) m², ie, 72-90 m², the size of another laboratory.

- the amount and type of science lessons taught (eg, CASE¹, or other project-based courses);
- the workload in certain areas of the curriculum, (whether some areas require more technician time than others);
- the general behaviour of pupils. (If this is poor, technicians may be required to perform routine clearing, tidying and repairing for most of their time.)

Full time, part time, term time only

Whether technicians are full time, part time or term time only, has a significant effect on the quality of technician provision. A full-time equivalent (fte) technician is calculated as one who works 37 hours per week (less in some LAs, schools and colleges) on a 52 weeks per year contract. It may suit some staff to be employed term time only, but the requirements of the department should also be taken into consideration, as well as the needs of the individual technician. (See also, sections 8.1 & 8.3.)

There are many important technician tasks that can usually only be carried out effectively during school holidays. If these are not performed, it is likely that there will be an adverse effect on the health & safety and efficiency of the department. These include: safety checks, replenishing stocks in laboratories, cleaning, stock checks, maintenance of equipment and forward planning. (In addition, the care of plants and animals needs to continue during the holidays.) This would suggest that in all establishments, at least one technician should be employed on a 52 week contract, preferably more than one to meet lone-working recommendations². A single technician working in the holidays would therefore be severely restricted in the activities that he or she could undertake.

CLEAPSS recommendations

A decision to employ term-time only technicians should not be made for financial reasons alone. A minimal saving is made in financial terms but there is a significant, adverse effect on the time available to do the job properly, the professional status and the career progression of technical staff. A full-time position may be more attractive to a technician considering the job as a career.

When deploying science technicians, departments should consider their practical requirements and the skills and experience of the technicians. They should also consider the efficiency and the health & safety of the department and the welfare and working conditions of the technicians.

¹ Cognitive Acceleration through Science Education project.

² Lone working occurs when there is no other employee nearby (on the same floor). During these times, hazardous activities such as handling hazardous materials, diluting concentrated acids and moving heavy objects should **not** take place. When working alone, someone in the building should be aware that a technician is working in a particular location even though she/he may not be undertaking work of a hazardous nature. *Cognitive Acceleration through Science Education* project.

4.2 Grades of technicians

Current grades

Some LAs / employers have no standard procedure for grading technicians so that it is often left up to individual establishments.

Many LAs and employers use the local government pay scales for all support staff, including technicians. This structure consists of a series of salary spine points from 4 to 49, with 4 being the lowest (see Table 5). Many LAs and employers split these spine points into blocks to give various grades and some do not. Of those employers who use the local government scales, many split them into grade blocks in a similar way to that in Table 5. These are typically grades 1 to 6, where grade 1 is the lowest. (The higher grades of SO & PO are *Senior Officer & Principal Officer* respectively and have rarely been attained by technicians in schools and colleges.) Some employers split the spine points into different blocks with some grades having overlapping spine points but others do not split into grade blocks at all. Some LAs have their own pay structures and some use the university technicians' pay scales (grades A to F). Some independent schools use the local government scales while others have their own structures or no grade structure at all.

In a survey of support staff within an LA which used the local government pay and grading structure as in Table 5, it was revealed that, amongst those surveyed, the average grade of a technician was 3. Within that LA, the lowest grade of a technician was 2 and the highest was 5. For administration staff, however, the average grade was 5; the lowest grade was 4 and the highest was SO1. Anecdotal evidence suggests that these grades are not uncommon in other LAs and with other employers.

Although the higher grades are uncommon, it appears that technicians have been graded at six or more different levels.

Problems with current grades

It has been well established that there is little or no correlation between employers (and sometimes schools within the same LA) and technicians' grades, even though the jobs are similar. Technicians have recently become more aware of this and are frustrated by the inconsistencies.

Technicians are often graded lower than other support staff within their establishments despite their responsibilities, skills and experience.

Because of the lack of a common, national grade structure for technicians, individual establishments sometimes decide technicians' grades based on financial considerations or the historical situation in the school, rather than by considering the skills and experience that technicians need to support the work of the science department.

Many science technicians have been employed on low grades that do not reflect the level of skill, expertise and experience that they have and the levels of responsibilities that are required for the job.

Table 5 An example of the local government pay scales (2008/2009) with grades commonly related to technicians

Spine Point	Annual salary ¹	Common grades used by many employers (exact grade borders can vary slightly)		Comments from CLEAPSS survey	
4	11961	1		More technicians were on scale 2 than any other scale. In a school with more than one technician, one of them would often be on scale 1.	
5	12125				
6	12299				
7	12592				
8	12989				
9	13382				
10	13663				
11	14545				
12	14847				
13	15247				
14	15524	3		It was very common for schools with three technicians to place the most senior on this grade.	
15	15849				
16	16230				
17	16614				
18	16941	4		Sometimes the most senior technicians were on this grade. Occasionally, a single technician in a school would be on this grade.	
19	17574				
20	18217				
21	18882				
22	19370	5		Technicians in schools were rarely on this grade. It is more commonly used in FE & VI-form colleges.	
23	19940				
24	20591				
25	21244				
26	21937	6		Almost no technicians in schools were on this grade. It is generally reserved for some in FE & VI-form colleges.	
27	22664				
28	23405				
29	24331	SO1		This grade was only used in some larger FE & VI-form colleges.	
30	25146				
31	25940				
32	26706	SO2			
33	27492				
34	28270				
35	28862		PO1	PO2	The survey revealed two technicians at this level.
36	29628				
37	30456				
38	31348				

¹ Equivalent to full time for a 52 week per year contract.

What grades should there be?

Schools and colleges need to consider carefully the following points when deciding which grades are appropriate for their technicians.

- *The skills, experience and knowledge required for the job.*
- *The levels of responsibilities required.*
- *The supervision received / given.*

The RS / ASE¹ have suggested that there should be four grades of technicians as follows.

- *Trainee technician.*
- *Technician.*
- *Senior technician.*
- *Team-leader technician / demonstrator technician / advanced skills-technician / technician adviser.*

CLEAPSS believes that four grades will be adequate to support the range of technician activities required by science departments in schools and colleges. The titles could be changed to T1 – T4, or for example A – D, depending on employers' preferences. It is likely that a technician adviser, who is responsible for technicians in a number of establishments, would be expected to be on a higher grade than technicians who work in a single establishment.

What the different grades mean

Trainee technicians

Trainee technicians are those who have little or no experience of science technician work. They may have some basic science qualifications and/or scientific background, but their work would need to be supervised, preferably by a suitably-skilled and experienced technician. They should only undertake basic duties and should not be allowed to carry out hazardous activities or handle hazardous materials, for example, making bromine water or diluting concentrated sulfuric acid, without direct supervision, until they have successfully completed an induction programme (see section 7.5). They should be encouraged to undertake formal and informal training, which can often be largely 'in house' and/or attend short courses to gain all the skills required to perform their duties unsupervised. Schools should then upgrade the trainee to technician status, to reflect the additional responsibilities he or she will have.

Trainees may be young school leavers with some science qualifications or those returning to work after parenting breaks, semi-retired people from industry or other areas, or those looking for a change of career. Many schools unable to recruit experienced technicians have greatly benefited by recruiting trainee technicians who have gone on to become highly skilled and valued.

Technicians

Technicians are those who have the required skills, experience and knowledge to carry out, unsupervised, the everyday duties that are required for the job. They have often started as trainees and have gained the skills and experience to become 'technicians'. Schools should not assume that technicians with an academic qualification, but no school laboratory experience, possess the required skills for the job. They will need to undergo at least part of an induction programme and further training, where appropriate, before they should be considered suitably skilled.

¹ *Supporting success: Science technicians in schools and college*, RS / ASE, January 2002, ISBN 0854035710.

Senior technicians

Senior technicians will possess all the skills required to carry out their duties and also the experience and knowledge of working as a technician in a school or college laboratory. In schools with three or less technicians, the senior technician will have line management, supervisory and training responsibilities for other technicians. He or she may also be responsible for the departments' accounts, ordering and stock control, etc. In larger establishments with more than three technicians, the senior technician will be required to deputise for the team-leader technician and have delegated responsibilities.

Team-leader / demonstrator / advanced-skills technicians

Team-leader technicians

Team-leader technicians will possess all the skills required to carry out their technician duties and have considerable knowledge and experience of working in a school or college laboratory. They will be responsible to heads of science for the organisation of the technician service in science departments. Team-leader technicians will enable proper administration of science departments and line management of their technician colleagues.

Demonstrator technicians

In some establishments, technicians are required to demonstrate to students and/or take some responsibilities for supervising students' practical work. A demonstrator technician will be skilled and experienced in his or her particular field and possess the ability to communicate effectively with students. Where a demonstrator technician is required, detailed discussions should take place with technicians, teachers, senior managers and relevant trade unions, regarding job descriptions and duties. Consideration needs to be given to the time needed for demonstrator duties and its impact on any other activities the technician is required to carry out.

Advanced-skills technicians

This grade would apply to a technician in a specialist area, for example, preparing metallurgical samples, or infra-red spectroscopy, etc. It is unlikely that this grade would be employed in many schools and colleges.

Technician advisers

Some LAs employ technician advisers whose role it is to advise and administer all the technician-related matters for schools within the LA. A specialist LA technician adviser would have detailed knowledge and experience of technician issues within schools and the position would be beneficial to schools by offering local support and advice. A technician adviser would also increase the status of technicians within the LA and offer another career progression route for technicians.

Allocation of grades

When schools have calculated the number of technicians that they need (see section 3), they need to determine the grades that the technicians should have. Tables 6 to 11 offer guidance on how grades of technicians may be decided, depending on the number of technicians in the science department.

Because many technicians work part time, the number of technicians in the following tables is based on the assumption that a technician works in excess of 30 hours per week. Where two individuals share a full-time post, they would count as one technician in using the tables.

Schools and colleges need skilled and experienced technicians. Therefore, the tables omit trainee technicians. Trainee technician grades should only apply temporarily for those who are actually training for the job. Once they have acquired the appropriate skills to perform their duties unsupervised, they should be treated, graded and paid as technicians.

The number of trainee technicians working in an establishment should be limited by the number of skilled technicians available to supervise them adequately, as suggested in the comments accompanying the tables.

The tables are only a guide to be used as a framework as it is recognised that individual establishments may have different requirements when deploying technicians. For example, in some establishments, technicians may work as subject specialists. In this instance, in an establishment with a team of four, full-time technicians, there may be one team leader and three technicians working in their own specialist areas who may all be the same grade.

Table 6 Establishments with 6 science technicians

1 Team-leader technician
1 Senior technician
4 Technicians

A maximum of three of the technicians should be trainees at any given time.

Table 7 Establishments with 5 science technicians

1 Team-leader technician
1 Senior technician
3 Technicians

A maximum of two of the technicians should be trainees at any given time.

Table 8 Establishments with 4 science technicians

1 Team-leader technician
1 Senior technician
2 Technicians

A maximum of two (preferably only one) of the technicians should be trainees at any given time.

Table 9 Establishment with 3 science technicians

1 Senior technician
2 Technicians

Only one of the technicians should be a trainee at any given time.

Table 10 Establishments with 2 science technicians

1 Senior technician
1 Technician

The technician grade could temporarily be a trainee.

Table 11 Establishments with 1 science technician

1 Senior technician or 1 technician

The position should never be filled by a trainee grade. A technician should only be used if there is no science administration or financial work in the job.

CLEAPSS recommendation

Four technician grades should be adequate to provide a range of technician levels to suit individual establishments. The grades should be determined to reflect the levels of skills, expertise, knowledge and experience required for the jobs. The lowest grade in any structure must be for trainees only, with little or no experience. When trainees have acquired the skills, knowledge and experience that is required for the job, they should be graded and paid as *technicians* to reflect the added responsibilities that they have.

4.3 Line management of technicians

As well as appropriate numbers and grades of technicians, it is important to have suitable line management within the technician team. The technicians can then organise the practical requirements of the department so that teachers can concentrate on their teaching.

It is important that line managers of technicians are thoroughly familiar with their day-to-day duties and responsibilities. Attempting to set up a line-management structure involving personnel outside the science department (eg, bursars or deputy heads) is therefore likely to be an unsatisfactory arrangement. This view has been supported in OFSTED reports as illustrated below.

- *“Two competent science technicians give good support but their line management outside the department causes inefficiencies in their deployment.”*

CLEAPSS recommendation

There should be a structure within the team, unless departments are small and only have one technician, with one technician being designated team leader (or senior in establishments with three or less science technicians), with a responsibility for deploying the team to meet the technical requirements of the department. The technicians should be responsible to the team-leader technician (or their immediate technician superior), with the team-leader technician responsible to the head of department.

5. Pay

5.1 The current situation

During the research for this guide, it became clear that there are several different salary structures being used by employers for technicians' pay (see section 4.2). Even though many employers use the local government pay structures (as in Table 5), it is evident that technicians with different employers, and sometimes in different schools run by the same employer, receive significantly different salaries, even though they are doing similar jobs. Often individual schools are left to decide technicians' pay for themselves.

The majority of school science technicians are paid between spine points 11 and 17 (see Table 5). The salaries in Table 5 are based on a full-time contract and since more than half of all technicians are part time and/or term time only, the actual pay that many receive is considerably lower than the FTE pay shown in Table 5. Part-time technicians are commonly employed for 30 hours per week and for 40 weeks per year. This gives an actual annual salary of between **£9,600 and £12,000** between spine points 14 to 21 (2008 / 2009).

Some schools and colleges do employ full-time technicians and some are at spine points 18 and above. In a few cases, technicians are paid up to spine point 31, though above point 22 is uncommon. Hardly any technicians are paid anywhere near the national average salary of £28,500 (2008 figures).

It is clear that technicians in FE and VI-form colleges are generally paid more than those in schools; technicians in middle schools are generally paid less than those in secondary schools.

5.2 Problems with current pay

The salary that most technicians receive does not reflect the levels of knowledge, experience and expertise that they have and that are required for the job, nor the responsibilities that go with the position. This has been widely recognised by science teachers, science education professionals (Royal Society, ASE, CLEAPSS, etc) and acknowledged by government departments and members of the House of Commons' Select Committee for Science and Technology (see section 5.3).

By itself, the low level of remuneration may prevent good-quality candidates from applying for technician positions. The low pay, coupled with the lack of a national pay and career structure, makes it difficult for technicians to see any future career prospects. As a result, many young people becoming technicians do so only as a stopgap and not with the view of becoming a technician as a career.

Tables 12 & 13 show the age and sex profiles of technicians (in 2001) and would seem to support this view.

Table 12 *Age profile of technicians¹*

Age range	%
18-30	7.9
31-40	20.4
41-50	37.9
51-60	29.4
Over 60	4.4

¹ *Survey of science technicians in schools and colleges*, RS / ASE, July 2001, ISBN 0854035664.

Table 13 Sex profile of technicians¹

Women	Men
75%	25%

In many cases technicians are not the main wage earners in a household and most are not the only wage earners in a household¹.

The low pay received by technicians seems to be a major factor in the lack of recruitment of young professional technicians and does not promote the view that being a school science technician is a serious profession.

A not uncommon example

During visits to schools and colleges, CLEAPSS came across the following example, which is not untypical of other technicians in similar positions. A young woman, 24 years old, having 'A'-level science qualifications had been working as a technician for just over a year. She had attended short courses and had received on-the-job training. Her senior technician described her as an excellent worker. She said that she loved her job, but that she would have to look for employment outside the technician service, as she could not afford to continue on the low salary.

5.3 How much should technicians be paid?

A few employers recognise the worth of science technicians and this is reflected in the pay that they receive. However, in general, most science technicians' pay is low and would need to be increased substantially to reflect the jobs that they do.

The report of The House of Commons' Science and Technology Committee² states: "*the pay and conditions under which technicians are employed strike us as downright exploitation... We expect to see action taken within the next year to address the appalling pay and conditions of science technicians and to create a career structure that will attract skilled and dedicated people to work as technicians.*"

As a result of a job evaluation of technicians in Bristol, it was found that many technicians would need to receive a salary increase of up to 30% to reflect the work that they do and the responsibilities that they hold. The 'Bristol scheme' used the local government spine points (as in Table 5) with a technician 'job family' of four grades. The spine points ranged from 10 to 34 as in Table 14.

Table 14 The Bristol scheme of grades and pay spine points

Grade	Spine point
Trainee (i)	10 – 13
Trainee (ii)	14 – 17
Qualified technician	22 – 25
Team-leader technician	30 – 34

¹ Survey of science technicians in schools and colleges, RS / ASE, July 2001, ISBN 0854035664.

² Science Education from 14 to 19, Third Report of Session 2001-02, Volume 1, Report and Proceedings of the Committee, The Stationery Office, ISBN 0215004248.

It has been suggested by the RS / ASE¹, that the Bristol model could be considered as the basis of a national scheme. Although this model may not necessarily be used, it would be reasonable to assume that the job evaluation was fair and that any national scheme adopted would have similar conclusions. It would be reasonable to suggest that technicians' pay may need to increase by approximately 25%, given the common view that salaries are generally too low for the work that is done.

What pay structure?

The four grades of technicians, as suggested in section 4.2, in conjunction with the local government pay scheme (Table 5), could be used to produce a grade and pay structure in schools and colleges (with an additional grade for a technician adviser; see section 4.2), for a nationally-agreed scheme. The local government pay structure is already used by the majority of employers and would therefore be the least disruptive to adopt. Assuming the recommended grade structure (section 4.2), and taking into account the information in this section and the results of the Bristol job evaluation scheme, a suggestion for technicians' pay and grades is given in Table 15.

Table 15 Suggested pay and grades

Grade	Salary spine point
Trainee technician	10 – 13
Technician	14 – 21*
Senior technician	22 – 28
Team-leader/ demonstrator/ advanced-skills technician	29 – 34
Technician adviser	35+

*Employers may not wish to have so many salary spine points within this grade. It is suggested that 4 or 5 points could be used within this range, for example, SP 16 – 20, with additional (discretionary) points awarded for any special circumstances. The same could apply to the top 2 points of the senior technician and team-leader technician grades.

5.4 Financial implications

It has been established that, in general, technicians' pay may need to increase by as much as 25%. Establishments could use this figure to calculate the increase to their staffing budgets that may be incurred should a national pay structure be agreed and implemented. The 25% rise would only represent the actual salary increases. The on-costs (National Insurance, pensions) to employers would need to be added to reach the actual figure. In many cases, however, the increase could be substantially less than 25% and, for a few technicians, there may be none at all.

An increase of 25% may appear alarming to the senior management of many establishments. However, the total cost of an increase of this magnitude, as a percentage of most schools' or LAs' budgets, is likely to be small, given that relatively few science technicians are employed and that they are generally not paid a high salary.

¹ Supporting success: Science technicians in schools and colleges, RS / ASE, January 2002, ISBN 0854035710.

Individual establishments should also consider if they would incur increased costs as a result of improving the number of technicians employed in order to provide a high-quality technical support service (see section 3).

CLEAPSS recommendation

A nationally-recognised pay structure for school and college technicians should be agreed and implemented. Funds should be made available and ring-fenced to upgrade technicians' pay. Individual establishments and employers should budget for any national agreements that may be developed. The consequences of failing to implement such agreements should be seriously considered, especially the effect this would have on the recruitment and retention of technicians and the quality of support available to science departments, and therefore the practical opportunities available to students.

6. Job descriptions

6.1 The current position

Technicians' job descriptions can vary considerably between schools even though their jobs may be similar. Job descriptions for technicians are sometimes prepared by colleagues from outside the science department (eg, bursars, personnel departments, deputy heads, etc), who may not know the requirements of the job.

Some employers use generic job descriptions for all their support staff, which do not contain the specialist tasks that science technicians are required to perform.

Science technicians job descriptions vary from relevant and up-to-date including all expected and appropriate duties to some which include tasks that would not normally be regarded appropriate for a technician. (For example, in one institution, science technicians are expected to replenish toilet rolls in the school's toilets.)

6.2 Problems with the current position

Generic job descriptions that are used by employers for all support staff may be useful for areas that are common to all support staff (eg, employers' equal-opportunities policy, etc). However, they are not helpful where they do not identify the duties and responsibilities that are specific to science technicians.

Technicians are no longer as isolated in their work; see section 1.3. Where technicians in various establishments have discussed job descriptions, they have become aware of the inconsistencies that exist. Job descriptions sometimes do not reflect the work that is actually done. Sometimes they include tasks that are not of a technical nature and that reduce the time available for technical work (eg, photocopying and administrative support for teachers). These inconsistencies have sometimes caused technicians to feel resentful and dissatisfied.

The job descriptions of some technicians include areas of responsibilities that are not reflected in the grade of the job or the salary paid. For example, a science technician for a grade 2 post (see Table 5) was found to have a job description which included responsibilities for conducting risk assessments for practical activities and administering & ordering equipment and other resources.

Schools and employers probably do not deliberately produce job descriptions for science technicians that are unhelpful. The lack of recognised core job descriptions for science technicians has meant that schools and heads of departments have received little or no guidance in the drafting of job descriptions for their science support staff.

6.3 What should be in science technicians' job descriptions?

Employers may still wish to have generic job descriptions for all their support staff and to have enough flexibility to allow for any special local conditions. This is acceptable, but with the curriculum in most schools being broadly similar, it is likely that science technicians' core activities are also similar. Therefore, all job descriptions should contain some of these activities.

Technicians' core activities

The following core activities could be used to produce job descriptions. The activities are those that are discussed in section 2.3. They are the tasks that technicians themselves have identified as the core of the work that they perform.

The activities that are considered as 'grey-area tasks' (see sections 2.2 & aspects of 2.3) are not included in the list below, as it is the opinion of CLEAPSS that they are not *technical* tasks

and they should not therefore be included in science technicians' job descriptions. If schools nevertheless still wish to include some of these non-technical duties, they must carefully consider whether they are deploying their technicians efficiently and utilising their knowledge, expertise and skills. They should also consider whether the non-technical duties are being performed at the expense of the other recognised technician duties and at the expense of health & safety considerations. Furthermore, schools should realistically assess whether the inclusion of non-technical duties adds significantly to the overall workload of their technicians, thereby contributing to a lowering of esteem and job satisfaction and/or increasing stress levels.

Core activities

- *Making up solutions.*
- *Assembling apparatus.*
- *Delivering equipment to rooms.*
- *Collecting, checking and returning equipment to stores.*
- *Taking care of laboratory equipment and apparatus.*
- *Carrying out and arranging for maintenance and repair of resources.*
- *Constructing and modifying apparatus.*
- *General laboratory cleaning (bench surfaces and fixed equipment).*
- *Cleaning laboratory sinks, emptying / supervising the emptying of sink traps.*
- *Organising and storing chemicals and equipment.*
- *Stocktaking chemicals and/or equipment.*
- *Obtaining materials by local purchase.*
- *Disposing of waste materials.*
- *Caring for plants and/or animals.*
- *Trialing practical activities.*
- *Carrying out risk assessments for technician activities.*
- *Providing technical support to experienced and trainee teachers including health & safety guidance.*
- *Providing technical support to students / pupils including health & safety guidance.*
- *Assisting in practical classes.*
- *Carrying out demonstrations.*
- *Keeping up to date with developments in practical science.*
- *Keeping up to date with health & safety requirements.*
- *Carrying out health & safety checks on laboratories, prep rooms and stores.*
- *Carrying out safety checks, which may include electrical equipment, fume cupboards, first-aid kits, pressure vessels and the condition of Bunsen burner tubing, eye protection, glassware, and chemicals that deteriorate.*

Additional activities of the team-leader and/or senior science technician¹

- *Placing orders; checking deliveries and invoices.*
- *Keeping financial records.*
- *Managing, monitoring performance and supervising other technicians.*
- *Training and arranging for the training of colleagues.*
- *Organising the technical support to the science department.*
- *Liaising with senior management and other departments.*

¹ A technician may help with some of these activities and/or be delegated to be responsible for others.

6.4 Producing a job description

It is unlikely that all the core activities in the list will be required in a particular job description. It is also not appropriate just to create a list of tasks. A good job description should indicate the frequency (eg, *as required, daily, weekly, monthly, termly, annually*) that each task is carried out. In addition, the levels of responsibilities (eg, *responsible for, assisting with*) should be included for each particular task.

A job description should state to whom the post holder is responsible and who she/he is responsible for supervising and organising.

It is recognised that all technicians will not perform exactly the same activities in all establishments. Therefore, it is not possible to produce a standard job description for each grade that would suit all schools and colleges. However, a general principle can be established whereby the core job descriptions, as in section 6.5, can be used and the activities required can be modified for individual departments. The responsibilities for technicians employed on a particular grade should be the same in all establishments.

Once job descriptions have been formalised, establishments should ensure that there are sufficient technician hours available to enable the job to be performed adequately, safely and efficiently.

Trainee technicians

Trainee technicians would perform some of the tasks in the list of activities, but would not be responsible for them. They would be responsible to the more senior technician(s) and the activities in the job description would include such words as: *assist, contribute towards, help or under the supervision of*.

Technicians

Technicians would be responsible for some activities but would assist the more senior technician(s) with others.

Senior technicians

Senior technicians (as in Tables 6, 7 & 8, section 4.2) would deputise for, and be responsible to, team-leader technicians. They would, by agreement, be responsible for junior technician staff and for certain activities. In addition, they would assist the team-leader technicians in some activities.

(A senior technician who is the most senior in an establishment, as in Tables 9, 10 & 11, section 4.2, would have a job description similar to the example in section 6.5 d for a team-leader technician, but with less line management and less supervision of other technicians.)

Team-leader technicians

Team-leader technicians would be responsible for organising technician teams and for the delivery of a technical service to departments as a whole. They may also have specific task responsibilities.

6.5 Core job descriptions

The following core job descriptions could be used as a basis for the particular grades. These are available from the CLEAPSS CD-ROM or web site as customisable documents so that schools and colleges can modify the activities (deleting those not required and adding others from the list of core activities) and their frequencies, to meet the individual requirements of science departments.

6.5 a Trainee technician

Key responsibilities	Activities that are likely to be carried out	Suggested frequency
<p>Under the control of the team-leader technician, (senior and/or technician where appropriate), to provide assistance and information as required in the preparation of resources for practical lessons that meets both the health & safety standards and the requirements of the classes involved.</p>	<p>Preparation of solutions, materials, cultures for living organisms.</p> <p>Assembling apparatus.</p> <p>Obtaining materials by local purchase.</p> <p>Trialing practical activities.</p> <p>Carrying out risk assessments for technician activities.</p> <p>Constructing and modifying apparatus.</p>	<p>Daily</p> <p>Daily</p> <p>Weekly</p> <p>As required</p> <p>Daily</p> <p>As required</p>
<p>Under the supervision of the technician (and/or higher grades), to provide general assistance in the safe storage, transit and accessibility of resources, including helping to:</p> <ul style="list-style-type: none"> • Ensure that stock levels are maintained and future requirements are identified; • Ensure the availability of suitable resources; • Compile orders and to liaise with suppliers and finance departments as/when required. 	<p>Delivery of equipment, materials and organisms to rooms.</p> <p>Collection of, checking and returning resources to stores.</p> <p>Maintaining resources, including routine repairs.</p> <p>Caring for plants and animals.</p>	<p>Daily</p> <p>Daily</p> <p>As required</p> <p>Daily</p>
<p>Assisting the technician team to ensure a healthy, safe and productive work environment through the routine maintenance and cleaning of equipment, laboratories and prep rooms.</p>	<p>Organising and storing resources.</p> <p>General cleaning of laboratory bench surfaces and fixed equipment.</p> <p>Cleaning laboratory sinks.</p> <p>Cleaning used equipment.</p> <p>Disposing of waste materials.</p>	<p>On-going</p> <p>Weekly</p> <p>Monthly</p> <p>Daily</p> <p>As required</p>

6.5 b Technician

Key responsibilities	Activities that are likely to be carried out	Suggested frequency
Under the (overall) control of the team-leader / senior technician, to coordinate the use of practical resources and facilities and provide assistance and advice in meeting the practical needs of the science curriculum, including liaising with teaching staff and support staff outside the department.	Preparation of resources, assembling apparatus. Obtaining materials by local purchase. Giving technical advice to teachers, technicians and pupils / students. Carrying out risk assessments for technician activities. Assisting in practical classes & carrying out demonstrations.	Daily Weekly Daily Daily Weekly
To ensure the maintenance of a healthy & safe working environment through: <ul style="list-style-type: none"> Actively contributing to the assessment, monitoring and review of both health & safety procedures and information resources; Keeping up to date with current procedures and practices through continuing professional development; the provision of technical advice and support on health & safety issues to teaching and trainee technical staff; the safe treatment & disposal of used materials including hazardous substances and responding to actual or potential hazards; the healthy & safe storage and accessibility of equipment and materials. 	Keeping up-to-date with health & safety requirements and with developments in practical science. (Attending courses & reading publications.) Giving health & safety advice to technical staff, teachers and students. Disposal of waste materials. Checking fume cupboards, pressure vessels and first-aid kits; carrying out electrical and other safety checks, etc. Organising, storing and checking the condition of chemicals and equipment. Attending department meetings.	As required Daily As required As required As required Monthly
To assist the team-leader / senior technician with the day-to-day organisation and development of trainee staff to ensure that essential performance standards are achieved.	Organising and supervising trainee technicians as required.	Daily
To contribute to the design, development and maintenance of specialist resources and/or long-term projects.	Constructing & modifying apparatus. Setting up and caring for plant and animal collections. Preparing standard solutions, purifying chemicals, treating waste.	As required Daily As required
To support the team-leader / senior technician in ensuring the availability of suitable materials and equipment, helping to compile orders and liaising or negotiating with suppliers and finance departments. This will include sourcing, costing and suggesting economic alternatives to maintain stock levels. Keeping up-to-date stock records.	Checking stock, ordering. Keeping stock records. Maintaining resources.	As required Annually As required
Under the (overall) guidance of the team-leader technician, to ensure that both routine and non-routine checking, cleaning, maintenance, calibration, testing and repairing of equipment are carried out to the required standard.	Collecting, checking and returning equipment to stores. General laboratory cleaning of bench surfaces and fixed equipment. Cleaning and repair of equipment.	Daily Weekly Monthly

6.5 c Senior technician (who is a deputy for a team-leader technician)

Key responsibilities	Activities that are likely to be carried out	Suggested frequency
Under the (overall) control of the team-leader technician, to coordinate the use of practical resources and facilities and provide assistance and advice in the practical needs of the science curriculum, including liaising with teaching staff and support staff outside the department.	Preparation of resources, assembling apparatus. Obtaining materials by local purchase. Giving technical advice to teachers, technicians and pupils / students. Carrying out risk assessments for technician activities. Assisting in practical classes & carrying out demonstrations.	Daily Weekly Daily Daily Weekly
To ensure and promote the maintenance of a healthy & safe working environment through: <ul style="list-style-type: none"> actively contributing to the assessment, monitoring and review of both health & safety procedures and information resources; keeping up to date with current procedures and practices through continuing professional development; the provision of technical advice and support on health & safety issues to teaching and technical staff; the safe treatment & disposal of used materials including hazardous substances and responding to actual or potential hazards; the healthy & safe storage and accessibility of equipment and materials. 	Keeping up-to-date with health & safety requirements and with developments in practical science. (Attending courses & reading publications etc.) Giving health & safety advice to technical staff, teachers and students. Disposal of waste materials. Checking fume cupboards, pressure vessels and first-aid kits; carrying out electrical & other safety checks, etc. Organising, storing and checking the condition of chemicals and equipment. Attending department meetings.	As required Daily As required As required As required Monthly
To assist the team-leader with the day-to-day organisation and development of technical staff to ensure that essential performance standards are achieved. (Where there is no team-leader technician, to take a lead role in this.)	Organising and supervising trainee technicians as required. Training and arranging for training of technical staff as required.	Daily As required
To contribute to the design, development and maintenance of specialist resources and/or long-term projects and offer professional guidance, assistance and support to students and teachers on the practical aspects of the curriculum.	Designing, constructing and modifying apparatus. Setting up and caring for plant and animal collections. Preparing standard solutions etc, purifying chemicals, treating waste.	As required Daily As required
To support the team-leader technician in ensuring the availability of suitable materials and equipment, helping to compile orders and liaising or negotiating with suppliers and finance departments. This will include sourcing, costing and suggesting economic alternatives to maintain stock levels. Keeping up-to-date records of stock.	Checking stock, ordering. Keeping stock records. Maintaining resources.	As required Annually As required
Under the (overall) guidance of the team-leader technician, to ensure that both routine and non-routine checking, cleaning, maintenance, calibration, testing and repairing of equipment are carried out to the required standard.	Collecting, checking and returning equipment to stores. General laboratory cleaning of bench surfaces and fixed equipment. General cleaning and repair of equipment.	Daily Weekly Monthly
To deputise for the team-leader technician and take a lead role in a specialist or subject area as required.	Taking a lead role in a subject area. Assisting with organising the technicians and monitoring performance.	Daily As required

6.5 d Team-leader technician (or the most senior in departments of 3 technicians or less)

Key responsibilities	Activities that are likely to be carried out	Suggested frequency
<p>To be responsible to the head of science in coordinating the use of, and development of, practical resources and facilities, including the provision of guidance and support in meeting the practical requirements of the science curriculum, including liaising with all areas of the school and outside organisations.</p>	<p>Organising the technical support team to the science department, including: assisting in practical classes, carrying out demonstrations, preparing resources, assembling apparatus.</p> <p>Giving technical advice to teachers, technicians and pupils / students.</p> <p>Carrying out risk assessments for technician activities.</p>	<p>Daily</p> <p>Daily</p> <p>Daily</p>
<p>To have overall responsibility for the promotion and observance of a healthy & safe working environment for the technical support service by:</p> <ul style="list-style-type: none"> • actively leading and coordinating the assessment, monitoring and review of both health & safety procedures and information resources; • keeping up-to-date with current procedures and practices through continuing professional development; • the provision of technical advice on health & safety issues to teachers and technical support staff; • the safe treatment and disposal of used materials, including hazardous substances and responding to actual or potential hazards; • the healthy & safe storage and accessibility of equipment and materials. 	<p>Ensuring the technician team keeps up to date with health & safety requirements and developments in practical science by ensuring that relevant literature is available and arranging for technicians to attend courses.</p> <p>Giving health & safety advice to technical staff, teachers and students.</p> <p>Disposal of waste materials.</p> <p>Checking fume cupboards, pressure vessels and first-aid kits; carrying out electrical and other safety checks, etc.</p> <p>Organising, storing and checking the condition of chemicals and equipment.</p> <p>Attending department meetings.</p>	<p>As required</p> <p>Daily</p> <p>As required</p> <p>As required</p> <p>As required</p> <p>Monthly</p>
<p>To ensure that the technical team is resourced, organised and developed to meet the performance standards required by the department.</p>	<p>Managing, monitoring performance and supervising colleagues.</p>	<p>Daily</p>
<p>To take a lead role in the design, development and maintenance of specialist resources and/or long-term projects and offer professional guidance, assistance and support to pupils & teachers on the practical aspects of the curriculum.</p>	<p>Designing, constructing and modifying apparatus.</p> <p>Setting up and caring for plant and animal collections.</p> <p>Preparing standard solutions, etc, purifying chemicals, treating waste.</p>	<p>As required</p> <p>Daily</p> <p>As required</p>
<p>To be responsible for setting up and monitoring systems used in the management and control of practical resources including:</p> <ul style="list-style-type: none"> • leading on stock control, compiling orders, liaising or negotiating with suppliers and maintaining appropriate records; • monitoring, controlling and keeping financial records of the departmental expenditure in accordance with the school's policy; • ensuring the availability of suitable materials and equipment and suggesting alternatives for suitability and economy. 	<p>Maintaining resources.</p> <p>Keeping stock records.</p> <p>Ordering stock.</p> <p>Keeping financial records.</p>	<p>As required</p> <p>Annually</p> <p>As required</p> <p>Weekly</p>
<p>To undertake the lead role within the science department on both routine and non-routine checking, cleaning, maintenance, calibration, testing and repairing of equipment to the required standard.</p>	<p>Ensuring the department's resources are maintained to the required standards.</p>	<p>Weekly</p>

6.6 Any other duties that may be requested...

Many technicians will recognise this heading, or something similar, as the last statement on many job descriptions. If all the requirements of a job are carefully considered, a comprehensive job description should be able to be produced that contains all that is required of a science technician. If employers continue to insist on a similar statement being in a job description, it should be challenged. They should be asked what the other duties are likely to be and, if they are relevant, then they should be included and be specific. If they are not relevant to science technician activities, then they should not be included and not be expected of a science technician. It could be argued that if this type of open-ended statement were in a job description, it would negate the need for *anything* specific to be included.

CLEAPSS recommendation

All technicians should have up-to-date and relevant job descriptions for the tasks they perform. Each job description should cover all the duties required and responsibilities for that particular grade. The duties should include only those that would normally be expected of a science technician, (ie, duties of a technical nature). The responsibilities, in particular, must be carefully considered and they must be correct for the grade.

6.7 Single-status job evaluation

The single-status job evaluation is an agreement made between local authorities (which include LAs) and unions whereby all local authority jobs are harmonised onto a single pay spine.

Local authorities can choose from a number of recognised job evaluation schemes that are in place (for example, Hay, Greater London Provincial, Whitley Council, NJC, etc). The outcome should be similar whatever scheme is used.

Mechanism of job evaluation

The job evaluation scheme involves looking at jobs (not individuals, who perform the jobs) and assessing various criteria required for the job. Points are awarded against the criteria, depending on the requirements of the job. Actual job tasks are not compared but the following are examples of the sorts of areas that are considered.

- *Supervision / management of people.*
- *Creativity and innovation.*
- *Contacts and relationships.*
- *Decisions.*
- *Resources.*
- *Work demands.*
- *Working conditions.*

Different job evaluation schemes may use different headings, but the general principles are the same.

Problems of single-status job evaluation for science technicians

Many job evaluation exercises are carried out by consultants or by members of personnel departments who do not understand the requirements or responsibilities of the job of a science technician. They rely upon receiving completed questionnaires, together with job descriptions and job specifications, from technicians and other staff, (often from a random sample of staff). As has been discussed in sections 6.1 & 6.2, some technicians' job descriptions do not accurately reflect what they do, or the levels of responsibilities involved in their jobs.

It is extremely difficult to compare the varied and complex roles and responsibilities of science technicians with those of other local authority staff. If those who carry out job evaluations do not have the correct information, it will result in science technicians being graded and paid incorrectly.

Many science technicians do not supervise and/or manage other staff. It is also often assumed that a head of science (or other teacher) manages and supervises the work of science technicians. These assumptions have wrongly lead to low points being awarded for the supervision criterion.

What is required?

It must be recognised that science technicians perform most of their duties without **any** direct supervision. (In reality, teachers are too busy to spend enough time in prep rooms to supervise a technician's work.) Given the skills and expertise required and the hazardous nature of most technician activities, the levels of responsibilities and the unsupervised work performed must be fully recognised and favourable points awarded accordingly.

Technicians and heads of science should make sure that those carrying out job evaluations have up-to-date and relevant job descriptions and that any other information supplied, for example, questionnaires, job specifications, etc, contain all the relevant information for science technicians to be graded correctly.

CLEAPSS recommendation

If asked to provide information for single-status job evaluation, technicians should attempt to seek advice from someone who is experienced in job evaluation for science technicians and who understands their roles and responsibilities, in order that the correct information is provided. Technicians unhappy with the result of a job evaluation should appeal against the decision.

7. Training, skills, qualifications and experience

7.1 The current position

Qualifications and training

The RS / ASE survey¹ discovered that over 90% of the technicians surveyed have formal qualifications, ranging from GCSEs to degrees. The vast majority have high-level qualifications. The age profile of technicians (Table 12) would suggest that many technicians might have gained their formal qualifications some time ago. Some technicians have gained / are taking part in work-based National Vocational Qualifications (NVQs). (The RS / ASE survey¹ indicated that, in 2001, this applied to less than 11% of technicians.)

The training undertaken by technicians to acquire the necessary skills for their jobs is largely carried out by in-house instruction from colleagues and by attending short courses.

Technicians are aware of the need for training to acquire new skills and update existing ones and they are usually willing to undertake training for these purposes.

Experience and skills

Many technicians have gained a great deal of experience working in school or college science departments. The RS / ASE survey¹ found that:

- *the average length of time that technicians had been employed as technicians was 12 years and 7 months;*
- *the average time that technicians had been in their current posts was 9 years and 9 months.*

This would suggest that the skills and expertise, which technicians possess, have been developed over a number of years. Many technicians will not have any formal qualifications but will have considerable skills, expertise and experience and have the ability to provide high-quality technical support to the science department.

7.2 Problems with the current position

Many technicians hold relatively advanced-level qualifications. It has been established that some of the qualifications may not be appropriate for technicians' work. For example, working for a science degree may have involved very little practical work. Other qualifications that, when gained, were relevant to technicians' jobs, for example, City & Guilds, BTEC, HNC, etc, may have been awarded a long time ago. However, the content of the courses leading to these qualifications will not reflect the current requirements of a technician's job, (eg, datalogging, use of ICT for stock control, etc). Other science qualifications gained (for example, in food technology, engineering, etc) may not be relevant for science technicians' present work.

Even technicians' up-to-date and relevant qualifications may be in a single subject, whereas technicians may be required to work in several subject areas.

The qualifications that technicians have gained are often not reflected in the salaries paid. The qualifications are also not always recognised as contributing to the professional status of technicians.

A national vocational qualification (NVQ) structure for science technicians in schools and colleges² has been in place, which currently is probably the most relevant for current technician work. However, the NVQ recognises what technicians can do; it is **not** a course providing

¹ *Survey of science technicians in schools and colleges, RS / ASE, July 2001, ISBN 0854035664.*

² *NVQ / BTEC, Laboratory Technicians: Working in Education.*

training. Schools, however, often do not have time to provide the systematic training which might be required to attain the necessary levels. The small percentage of technicians currently participating in the NVQ, (see section 7.1), is mainly due to the following.

- *The need for training to support the assessment framework.*
- *The lack of assessment centres nearby.*
- *The reluctance of some employers to fund the training.*
- *The limited current opportunities for the award of the qualification to lead to a salary increase.*
- *The perception by some technicians that the current NVQ structure is not relevant for their work.*
- *The perception by technicians with higher-level qualifications, eg, degrees in science, that participating in the NVQ will not further improve their skills.*

Technicians have consistently expressed the need for relevant and continuing training but have been frustrated by the lack of opportunities, as follows.

- *The lack of courses available in the local area.*
- *The reluctance of schools / colleges to fund short courses. (Technicians are sometimes at the end of the queue, after teachers, for limited training funds.)*
- *The reluctance of schools / colleges to release technicians. (Practical work continues while a technician is on a course and, therefore, it can be difficult to arrange for the work to be covered. Also, senior managers may be unaware of the need for technician training as a result of the inadequate perception they may have of what technicians do.)*
- *Technicians failing to receive course publicity materials or these arriving too late.*

7.3 What is required?

The report of the House of Commons Science and Technology Committee¹ states: *“It is essential that technicians have opportunities for professional development. This will mean not only making appropriate courses available but also ensuring that technicians have the time and funding to be able to participate.”*

Science education in schools and colleges is constantly changing with technological and scientific advances. As well as their usual duties, technicians are expected to keep up to date with changing health & safety requirements and to implement new health & safety legislation and guidelines. They need to acquire new skills in developing areas (including microbiology and biotechnology) and learn to use, set up, service and repair more advanced and sophisticated equipment. In particular, **technicians, as well as** teachers, need to receive training in ICT when this is offered within a school. Technicians are required to give more advice and assistance to teaching staff, NQTs and pupils / students, particularly during open-ended investigative work. They also need to receive in-house training in emergency procedures, for example, fire fighting, eye irrigation, etc.

Technicians are also often trained to administer first aid. Although this is not usually a requirement of a technician's job, the advantage of technicians being responsible for a science department's first aid is that, in an emergency, they are usually available to administer any immediate remedial measures that may be required. However, all science staff should be trained in immediate remedial measures. If a technician becomes a school's first aider, she/he may often be called out of the department, which cannot be a good thing for science.

The changing demands of technicians' jobs have made it essential that good-quality training is available to them. It is particularly important, for example, in handling chemicals where

¹ Science Education from 14 to 19, Third Report of Session 2001-02, Volume 1, *Report and Proceedings of the Committee*, The Stationery Office, ISBN 0215004248.

technicians have little or no experience in chemistry, in preparing for microbiological work, in maintaining & handling radioactive sources and in all matters concerned with health & safety.

If training courses were to become available (either for study in the evening or as day-release) which lead to recognised qualifications and that are tailored to the needs of school and college science technicians, they would be an effective way for technicians to gain the skills and qualifications required for their jobs. When a national career progression route is in place and measures are taken to encourage the recruitment of technicians, awarding bodies and FE colleges should be encouraged to explore the possibilities of offering courses for school and college technicians at various levels (for example, City & Guilds, BTEC, etc).

Training and skills

Science technicians need to be properly trained for their jobs. It has been shown that many technicians stay in their posts for a considerable time (see section 7.1.2). Therefore, good-quality training will benefit the departments in which technicians work. It can also bring to technicians:

- *enhanced skills and knowledge;*
- *greater professional status and self-esteem;*
- *improved morale, enthusiasm and efficiency;*
- *progression through a career pathway;*
- *professional contacts with fellow technicians;*
- *the future possibility of improving salaries.*

Training can be provided through a number of different routes.

- *By gaining a recognised qualification. This can be achieved by attending day-release courses (if any are available).*
- *By attending short courses (eg, skills, health & safety, management, etc, as run by CLEAPSS and other training providers).*
- *By attending in-service training and induction programmes.*
- *By in-house training, being taught by technician and teacher colleagues, (either informal or to support a NVQ).*
- *By attending meetings of technician groups and conferences, usually arranged by a LA, some science equipment suppliers or the ASE.*

Qualifications and experience

It would be desirable if more technicians were able to participate in the NVQ for science technicians in schools and colleges. NVQs are not training programmes but they are based in the workplace where technicians demonstrate the skills, abilities and knowledge that they possess or have acquired, in order to perform their duties. Although based in the workplace, NVQs are administered and assessed by approved centres (usually FE colleges). The qualifications are based upon the Occupational Standards developed by the Science, Technology & Mathematics Council and the National Training Organisation. The standards allow the performance of technicians to be recognised with nationally-approved qualifications. Different levels of NVQs are available which will be appropriate for different grades of technicians. Table 16 suggests what these might be.

Table 16 NVQ levels and technician grades

NVQ level	Technician grade
1	Trainee technician
2	Technician
3	Senior technician
3 or 4	Team-leader technician

It is possible for technicians to gain the skills required for their jobs without having any formal qualifications. However, nationally-approved qualifications such as a NVQ would recognise the skills that technicians possess and would be beneficial, should any nationally-recognised career progression route be implemented.

A science degree or other academic qualification, by itself, may not best equip an individual to perform the duties of a technician although it is likely to give background knowledge and a *feel* for the science activities undertaken. Even those already qualified, for example, with a science degree or a vocational qualification that was gained some time ago, may benefit from gaining a NVQ. Many experienced technicians have said that working for the award of a NVQ has enabled them to update their skills and assess and re-evaluate their working procedures.

Technicians can improve their skills and gain substantial expertise simply through the experience of working in their current jobs and working with experienced colleagues. Varying amounts of experience gained by working as a school or college technician are required for different grades of post. Experience in an industrial or medical laboratory may not be relevant to the type of work carried out in schools and colleges. Experience as a university technician may be appropriate, particularly if the position was in an education department or a first-year graduate laboratory.

To progress to a higher grade, science technicians should have gained experience working as school / college technicians and should demonstrate that they have acquired the extra skills required for a higher-grade post. Table 17 shows the amount of experience and qualification levels that science technicians may be required to possess in order to be awarded certain grades. It is similar to, and based on, the scheme used in Bristol schools. Table 18 shows national equivalent qualifications.

Table 17 Example of how experience, qualification levels and grades may be linked

Experience ¹	Qualification level	Grade
Up to 1 year	1	Trainee technician
2 years	2	Technician
3 years	3	Senior technician
4 years	3 or 4 ²	Team-leader technician

¹ Experience gained by working as a science technician in a school or college.

² Level 4 may be considered here.

Table 18 National equivalent qualifications

Level	General	Vocational	Occupational	Old qualifications
1	GCSE (grades D-G)	GNVQ foundation BTEC foundation Vocational GCSE (grades D-G)	NVQ level 1	-
2	GCSE (grades A*-C)	GNVQ intermediate BTEC first BTEC intermediate Vocational GCSE (grades A*-C)	NVQ level 2	C & G ordinary C & G part (i) ONC OND
3	Advanced Subsidiary GCE	GNVQ advanced AVCE	NVQ level 3	C & G advanced C & G part (ii) & (iii)
	Advanced GCE	BTEC national BTEC advanced		
4	Degrees	BTEC higher national	NVQ level 4	HNC HND
5		-	NVQ level 5	-

7.4 Where and how to obtain training and qualifications

Short courses

Short courses for technicians are provided by a number of different course providers, for example, CLEAPSS, ASE and various commercial organisations and at varying costs. Some schools and colleges arrange for some technician training in-house through staff development, (eg, ICT skills). Also, many LAs arrange training in computing skills, manual handling, etc, and conferences for science technicians. The publicity for many courses is sent in the post to schools and colleges, (particularly by commercial providers), but may not always be addressed to the science technicians. Technicians should, therefore, encourage heads of science, administration staff and anyone else who may receive course publicity, to pass the information to technicians so that they can apply in plenty of time. Some course providers have web sites, for example ASE¹ and CLEAPSS², so that if technicians have Internet access, they can obtain information directly.

CLEAPSS courses and progression

In addition to the current CLEAPSS one day courses for technicians, it is possible that in the near future CLEAPSS will provide a full training programme for new / inexperienced technicians. Technicians will be trained and assessed by CLEAPSS staff over a period of time and if successful they will be issued a certificate of competence at that particular level.

¹ www.ase.org.uk.

² www.cleapss.org.uk.

CLEAPSS one day courses

CLEAPSS provides various courses for technicians, the details of which can be obtained by visiting the CLEAPSS web site or by contacting the CLEAPSS *Helpline*. The courses are provided by CLEAPSS but, at present, are not always organised by CLEAPSS. Courses are sometimes requested by a LA (often by a science adviser or inspector), who will organise a venue and arrange course publicity and fees. CLEAPSS will then endeavour to provide the requested course (subject to a minimum number of participants). CLEAPSS organises some courses and recruit participants itself, usually at the request of an Associate member offering its school as the venue. Where LAs arrange courses, they often invite or accept applications from technicians working outside the LA (both from independent schools and from other LAs), although the course fee may be higher.

Science Learning Centres

The National Network of Science Learning Centres provides training for teachers and technicians. For information about courses at the National and Regional centres visit their web site, www.sciencelearningcentres.org.uk.

Recognised qualifications

Some technicians have, in the past, gained qualifications relevant to their jobs by attending day-release or evening courses whilst employed. The provision of these types of courses has declined considerably and it is now difficult for technicians to gain recognised qualifications in this way.

In some establishments, it may be possible for technicians to participate in courses that are offered at their place of work. These would most likely be the general and vocational qualifications, as in Table 18.

The NVQ for laboratory technicians working in education has been considered to be the most relevant qualification recently available to technicians. As discussed in section 7.3, it is work-based and assesses skills and abilities. More information regarding the NVQs can be found on the following web sites.

- www.vqset.org.uk
- www.edexcel.org.uk

Registration for the NVQ needs to be through an approved centre. Approved centres do not appear on the awarding bodies' web sites, so that technicians who wish to register for the NVQ may have difficulty finding a suitable approved centre. Lists of approved centres can, however, be found on the ASE web site (see footnote on previous page) in the *technicians' area*¹ and on the web site of the Institute of Science Technology.

- www.istonline.org.uk

Where more information regarding approved centres is required, it is suggested that the awarding bodies are contacted.

¹ Access to this area can only be gained by ASE members.

7.5 Induction

Schools and colleges have a legal requirement under the *Management of Health & Safety Regulations*¹ to provide training and induction for staff. The regulations particularly emphasise that employees under the age of 18 *should be protected at work from any risks to their health & safety, which are a consequence of their lack of experience, or absence of awareness of existing or potential risks.*

Schools and colleges should have in place an induction programme so that science technicians new to a school or college can become competent in the tasks required by their jobs and familiar with the practices and procedures of the establishment. It is particularly important to give new trainee technicians, with little or no technical experience, an outline of their duties and responsibilities before they start any formal or informal training. It is also important for new, but experienced, technicians to enable them to integrate into the systems and procedures of the department. Establishments operate in different ways and, without induction, it can sometimes take several months before new technicians gain sufficient knowledge of the working practices of an establishment and the science department.

CLEAPSS offers further guidance on science technicians' induction and training in Guide G234, *Induction and Training of Science Technicians.*

7.6 Funding for training

The Royal Society / Association for Science Education² have recommended that: "*The Government should make (ring-fenced) funding available for the continuing professional development of science technicians. The funding should be separate from, and in addition to, funds allocated for classroom assistants. The total level of such funding should be not less than £3 million per annum.*". The report of the House of Commons Science and Technology Committee³ also states that funding should be made available (see section 7.3).

CLEAPSS recommendation

Schools and colleges need to make adequate provision for technician training as part of effective performance management. They should ensure that funds are made available for science technicians' training and they should ensure that technicians are released to attend training. (Pressure of work should not prevent technicians from attending courses.) Training should be on-going so that technicians can regularly update their skills. Employers should recognise technicians' qualifications, skills and experience in the grades awarded and salaries paid.

Establishments should ensure that all course publicity relevant to technicians is passed to them promptly. Technicians should check the CLEAPSS web site (www.cleapss.org.uk) for short courses in their area. They should make course organisers in their areas (eg, science advisers, technicians' group leaders, etc) aware of their training requirements.

¹ *Management of Health and Safety at Work: Approved code of practice and guidance*, 1999, HSE Books, ISBN 0717624889.

² *Supporting success: Science technicians in schools and colleges*, RS / ASE, January 2002, ISBN 0854035710.

³ *Science Education from 14 to 19, Third Report of Session 2001-02, Volume 1, Report and Proceedings of the Committee*, The Stationery Office, ISBN 0215004248.

8. Working conditions

8.1 The current position

Prep room environment

Science technicians work in the prep room for the majority of their time in schools. Prep rooms can vary considerably from establishment to establishment. They have often been converted from offices or other rooms and are rarely purpose-built. Sometimes prep rooms are not near to the laboratories that they serve and sometimes they are located on different floors or even in a different building. Where schools and colleges have had science departments refurbished, the requirements of the prep room and storage areas have sometimes not been fully considered and the views of the science technicians not sought.

Nowadays, science technicians in many schools provide support for more than one science subject area and the prep rooms in which they work may cater for all sciences taught.

Hours of work and breaks

Many science technicians do not take lunch breaks and/or other mid-morning or mid-afternoon breaks because of the pressure of the time taken in clearing away and preparing materials for the next lessons.

The majority of science technicians in schools in England and Wales are employed as part-time and/or term-time only staff (see section 4.1). Most of these are entitled to some paid holiday. The salary for the number of weeks holiday allowed is usually added to the salary for the number of contracted working weeks. A proportion of a full-time (52 weeks) annual salary is then calculated and divided into 12 equal monthly payments.

Example:

Technician works 42 weeks; paid holiday entitlement = 4 weeks.

Total annual salary, 42 + 4 = 46 weeks paid per year.

Actual annual salary = $\frac{46}{52}$ of a full-time (52 weeks) salary.

Technicians in Northern Ireland

In Northern Ireland, an agreement has been reached to introduce 52 week contracts for former term-time only staff, with the option of being able to take unpaid leave during school closures if technicians require more than their paid-leave entitlement. This means that no one is a *compulsory* term-time only technician.

8.2 Problems with the current position

Prep room environment

Inadequate and crowded prep rooms can lead to equipment and materials being stored in laboratories and/or other areas away from the prep room and may not be easily accessible, especially during lesson times. Such prep rooms can easily become cluttered and this may affect the ability of the technicians to perform their duties in a healthy, safe and efficient manner. Science technicians already need to consult manual handling risk assessments in order to deliver and retrieve materials safely between prep rooms and laboratories (using trolleys, hoists, lifts, etc). Where prep rooms are not near to laboratories, transporting materials safely along corridors, when they are not busy and congested, and having to go through several fire doors, requires extra planning and health & safety considerations and may reduce the efficiency of the technical service.

Hours of work and breaks

In establishments which employ term-time only science technicians, it may not be possible to perform some essential technician activities (eg, maintenance, safety checks, replenishing stocks, etc; see section 4.1).

Where technicians do not regularly take lunch breaks and/or mid-morning and mid-afternoon breaks, it could indicate that there are inadequate numbers of science technicians employed and/or that the technicians are not being deployed efficiently (see sections 3 & 4).

Under the Working Time Directive, nobody is allowed to work for more than 6 hours continuously without a break.

8.3 What working conditions should science technicians have?

Prep room environment

Science technicians should have a clean, healthy and safe environment in which to work. They should have adequate lighting, heating and ventilation¹. (Prep rooms should have at least six room air changes per hour, which requires that they should have windows that can be opened sufficiently wide and/or forced ventilation, particularly if chemicals are also stored in them.) Prep rooms should not only be a safe and healthy place for technicians but also for visitors. They should be kept tidy and uncluttered and should be organised in an efficient manner. This will contribute towards a safe working environment and will encourage teaching staff to be organised by promoting an efficiently-organised technician service. Prep rooms should not normally be used as teaching staff meeting rooms nor for the storage of teachers' personal articles, pupils' note books, etc. Pupils / students may visit the prep room to collect items upon the request of a member of staff. However, they should not be allowed to enter the room, nor allowed to work in there, for example, to complete a task they may have missed through absence. The prep room should not be used as a 'sin bin'!

Prep rooms (and storage areas) should be as near as possible to the laboratories that they serve, and of an appropriate size to allow the technicians to carry out their duties in a healthy and safe way. DCSF guidance² recommends the following formula.

$$\text{Area of prep room and storage} = \text{number of student places in science} \times (0.4 \text{ to } 0.5) \text{ m}^2$$

(For a school with six laboratories, each holding 30 students, 72 to 90 m² of prep room and storage space is needed, ie, the size of another laboratory.)

For further advice on organising the prep room, refer to the CLEAPSS Guide G14, *Designing and Planning Laboratories*, chapter 7 and to sections 8.4 & 8.5 of the CLEAPSS *Laboratory Handbook*. These give guidance on the prep room size and location. In addition, they discuss organisation for the efficient running of the department and for a healthy, safe and efficient environment in which science technicians can work.

It may not be possible to follow all the guidance, given the constraints of existing accommodation. However, an attempt should be made to use the current facilities most efficiently and to use the guidance as a template to work towards in the future. The report of the

¹ DCSF, *Building Bulletin 87, Guidelines for Environmental Design in Schools*, 1997, The Stationery Office, ISBN 0112710131.

² DCSF, *Building Bulletin 80, Science Accommodation in Secondary Schools*, 1999, The Stationery Office, ISBN 0112710395.

House of Commons Science and Technology Committee¹ states that: “*good laboratory and prep room facilities are important because they enable high-quality practical work to be carried out in a pleasant environment, motivating and inspiring staff and students alike.*”. The report goes on to recommend that: “*over the next 3 years, the Government should ring fence a minimum of £120 million to bring all school laboratories **and** prep rooms up to at least adequate standards.*”. The report further states that: “*refurbishment of a prep room would cost a minimum of £13,000.*”.

Computers in the prep room

It has become increasingly necessary for science technicians to use computers to perform many of their duties efficiently. Computers are used for routine administration, checking catalogues, accessing health & safety information, compiling and updating stock lists, producing labels and technician-related documents, etc. Computers in prep rooms should be connected to the Internet to enable technicians to access important health & safety data, suppliers, equipment lists and technician user groups and discussion sites. They should therefore be of a reasonable quality, not discarded machines from other departments. CLEAPSS information is now issued electronically and on the CLEAPSS web site. It is likely that this trend will continue, with paper hard copies of documents becoming less available. It is therefore essential that technicians have access to modern computers **in their prep rooms**, in order to carry out their duties safely and efficiently.

Hours of work and breaks

It has been established that many science technicians in schools are employed on part-time and/or term-time only contracts. (More VI-form and FE colleges than schools employ full-time science technicians on a 52 week contract.) When employing science technicians, the needs of the department as well as of individuals should be considered (see section 4.1). In the report of the House of Commons Science and Technology Committee, it is stated that: “*The pay and conditions under which technicians are employed strike us as downright exploitation. We can see no reason why technicians should be paid during the term time only. Those technicians, who prefer not to work during the holidays, carrying out essential tasks such as equipment maintenance, should be employed on part-time contracts; the others should be treated like teachers and paid an annual full-time salary. The lack of opportunities for career or pay progression needs to be addressed.*”. CLEAPSS endorses this view.

With term-time only staff entitled to some holiday pay, in addition to their contracted weeks worked, schools and colleges could employ all technicians on full-time, 52 week contracts at minimal extra cost, but with a significant positive effect on the professional career status of science technicians. (See also section 8.1 with reference to technicians in Northern Ireland.)

The exact starting and finishing times of work are subject to local conditions of service and requirements. It may not be in the best interests of the department to have a rigid system that requires starting and finishing work at specified times. A flexible arrangement would allow for particularly busy times of the school year and for project work and any special requirements for practical exams or assessments. The team-leader technician, in consultation with the head of science and the individual technicians concerned, should assess the technical support needs of the department and decide the best system accordingly.

¹ Science Education from 14 to 19, Third Report of Session 2001-02, Volume 1, *Report and Proceedings of the Committee*, The Stationery Office, ISBN 0215004248.

Science technicians are entitled to take breaks as stated in their contracts and it is recommended, for reasons of efficiency and health & safety, that technicians *should* take breaks. In order that technicians can take breaks as well as maintaining services to the department, a rota system for breaks should be implemented. As with starting and finishing times of work, the system could remain rigid or be flexible to allow for particularly busy times. It is desirable if science technicians can take breaks at the same time as science and non-science staff, so that they can socialise with them in the staff room and so help become part of the whole school staff, rather than being viewed as isolated *non-staff* by non-science department teachers.

Communication

Effective communication between all members of a science department is essential if it is to be run in a healthy, safe and efficient way. Science technicians should be encouraged to be present at department meetings. They can make a significant contribution to the success of the department and should be part of the decision-making process. As well as contributing to discussions about laboratory use, the school timetable, technician hours, refurbishment, etc, they have a valuable role to play in offering their advice on the practicalities of particular experiments, alternative procedures and health & safety. Departments should encourage technicians, who may not usually be at work after normal school teaching hours, to stay for meetings by offering time off in lieu or payment for extra time spent at meetings.

Requests for equipment

Science departments should have a policy, agreed by all science staff, on the system for requesting materials for practical classes. The notice required should be as long as is practicable but CLEAPSS would suggest that **no less** than three working days is appropriate. (In some schools, all requests for materials for the following week are required by the previous Thursday lunchtime. This allows for proper planning, equipment clashes to be avoided, efficient shopping for local purchases, etc.) Although technicians may understand that late requests from teachers can sometimes happen, these should be the exception and not a common occurrence. Teachers should be made aware that late requests and interruptions might cause technicians to rush or make mistakes and that this is not acceptable since the technicians' health & safety must be safeguarded. Teachers should therefore pay attention to the health & safety implications of late requests and appreciate why technicians may not always *deliver* in these circumstances. In addition, teachers should not put technicians in a difficult position by asking them to do something that is not their job.

8.4 Status

All school and college staff, including senior management, should recognise the invaluable role that science technicians play and treat them as respected members of staff. Teachers should make students aware that science technicians are members of staff and that instructions from them (particularly on health & safety issues) carry the same authority as those from teaching staff. The team-leader or senior technician should be regarded as a senior member of staff who has line-management responsibilities as well as other recognised technician duties. The status of technicians could be improved within an establishment by *educating* non-science staff about science technicians' roles (see section 2), so that they are not seen as *errand people* or *science department slaves* but highly-skilled staff. Technicians should deliberately aim to become part of the whole school, visiting the staff room, dining room, etc, so that when other staff know them better, they are more likely to be respected.

Situations in which science technicians are not allowed or welcomed into staff rooms, or not invited to school social events, must not be tolerated.

CLEAPSS recommendation

When any rebuilding or refurbishment of science departments takes place, consideration must be given to the needs of the prep room, with respect to the science technicians' working environment and to the efficiency and safety of the technical service. The science technicians' views should be taken into account during initial planning. Any new, or refurbishment of, science department accommodation should permit a system of safe delivery and retrieval of materials between laboratories and prep rooms.

Employers should consider employing all technicians on 52 week contracts with the option of taking additional, unpaid leave during school closures (as in Northern Ireland).

Employers should look at ways to improve the working conditions of science technicians that promote the implementation of a professional service and reduce any stress that may be caused by overwork or poor communications.

9. Recruitment

9.1 The current position

Schools and colleges recruit science technicians in a number of ways.

- *From advertisements in local newspapers.*
- *From advertisements in national publications.*
- *From ex-pupils and sixth formers of the school or college.*
- *From relatives or friends of pupils, staff, etc.*
- *From job centres.*
- *From staff already working in other areas of the school.*
- *From LA newsletters or bulletins.*
- *From Internet technician discussion sites.*

Science technicians employed by any of these routes can provide valuable technical assistance both in the long term and as short-term cover for sickness, maternity leave, etc.

9.2 Problems with the current position

Currently there is no recognised national publication or other medium for advertising school and college science technician vacancies. This will make it difficult for those looking for jobs, either in their local areas or further afield, to predict where any vacancies may be advertised.

The current lack of a nationally-recognised pay, grade and career structure means that technicians wishing to gain promotion may find it difficult to compare vacancies with their current positions.

The House of Commons Science and Technology Committee¹ has said that: *“Technicians have a vital role to play in providing high-quality science education. Schools need to employ an additional 4,000 technicians if science departments are to be properly supported. It will only be possible to recruit these additional staff if the appalling pay and conditions for technicians are improved.”*

The recognised shortage of technicians means that, in order to fill vacancies, staff employed as science technicians may not start their jobs with the necessary skills and experience. (This is often the case with those employed for temporary cover.) They will need induction, training and supervision, which will need to be performed by already overworked, skilled technicians and/or science teaching staff.

9.3 How to recruit science technicians

Advertising vacancies

Where to advertise

It would be desirable if there was a national medium that was recognised as the best place to advertise and to look for science technicians' jobs in schools and colleges, (as is the case with teaching vacancies). Schools should consider the existing options and decide which would be most likely to produce the best response in their circumstances. Wider coverage would most likely be obtained from advertising in the education sections of national newspapers (eg, the Guardian, Times, etc) and in national publications such as the New Scientist and ASE publications. These may be expensive but if schools are already using these publications to

¹ Science Education from 14 to 19, Third Report of Session 2001-02, Volume 1, *Report and Proceedings of the Committee*, The Stationery Office, ISBN 0215004248.

advertise teaching vacancies, the additional cost of adding science technician vacancies may be relatively small.

Advertising on the CLEAPSS web site

CLEAPSS plans to advertise technician vacancies at any member schools on our web site. As all LA schools, most independent schools and colleges are members, this will provide a national site for technicians' jobs. It is hoped that this will also highlight good example schools that value their technicians and therefore improve the status and conditions of technicians

What should be in an advertisement

To keep the cost of advertising to a minimum, the text should be as brief as possible but should contain enough relevant information for applicants to consider. The following should be included in advertisements for science technicians.

- *The name and address of the establishment where the job is and the contact details from which to obtain information and an application form.*
- *The title of the post (eg, trainee, senior, chemistry technician, etc).*
- *The grade and salary range.*
- *Whether the post is full or part time (or term time only).*
- *Whether the post is permanent or temporary.*
- *The qualifications and/or experience required.*
- *When the job is to commence.*
- *The closing date for applications.*

Information that should be sent to applicants

Together with an application form, the following should be supplied to applicants.

- *Information about the establishment.*
- *Information about the science department (eg, on split site, etc).*
- *Information on the science courses taught.*
- *Information on the number and designation of other science technicians.*

In addition to these, applicants should receive a concise job description (see section 6) and a person specification. The person specification is sometimes called a job specification (or other name depending on the employer) and should contain what is required of the successful applicant with regard to experience, qualifications, knowledge, technical skills, interpersonal skills, etc. Applicants should also be told to whom they will be responsible and if they will be responsible for supervising / line managing other staff.

Shortlisting, interviewing and selection

Applicants should be shortlisted for interview based on how the information provided demonstrates their abilities to meet the requirements of the person specification. (For the purpose of shortlisting and interviewing, the person specification often becomes the *selection criteria*.) Once the shortlist has been decided, the shortlisted candidates should be informed and given a date and time for interview with an opportunity to visit the school or college prior to their interview.

Schools / colleges may require staff from personnel departments and/or senior managers to be present at interviews. However, it is important that the head of science, or another senior science teacher and the most senior science technician (unless the job is for this position) are also present on the interview panel.

At an interview, candidates should be made comfortable and at ease as much as possible and be told the approximate length of the interview, usually between 20 and 45 minutes. The

questions asked at an interview should be simple and open-ended to enable further exploration of the applicants' ability to meet the selection criteria and should be followed by supplementary questions where necessary. This should enable candidates who may be nervous and inexperienced at interviews, but who would be suitable for the job, to demonstrate their qualities. Long, awkward questions may not give an indication of the most suitable candidate and may instead only indicate the best person at interviews. Specific questions should be asked that require candidates to demonstrate their knowledge, skills and ability to fulfil the requirements of the selection criteria. The questions asked will depend on the grade / level of the post and the specific requirements of the job (eg, whether single-subject specialist, all sciences, lower-school work only, etc). Some examples of questions that could be asked are listed below.

- *How would you dilute concentrated sulfuric acid to make a bench solution?*
- *Where would you look for information on chemical safety?*
- *What are the health & safety precautions you would use when preparing microbiological materials?*
- *How would you dispose of, or find out how to dispose of, a specimen of a vertebrate preserved in methanal (formalin)?*
- *How and where should radioactive substances be stored?*
- *How would you test for a blown fuse?*
- *What would you do if a teacher asked for something, or was carrying out an activity, that you considered dangerous?*
- *What would you do if two teachers asked for the same piece of equipment to use at the same time (and there was only one of these pieces of equipment in the school)?*

Various tasks could also be included at interview, so that applicants can demonstrate particular skills that will be needed for the job. All candidates should be asked the same questions and, if tasks are included, given the same tasks to perform.

At the end of the interview, candidates should be given the opportunity to ask questions. They should then be asked if they would accept the job if it was offered to them. The successful candidate should be told of the decision as soon as possible and, once she/he has accepted, the unsuccessful candidates should also be informed.

CLEAPSS recommendation

Schools and colleges should advertise science technician vacancies nationally. The advertisements should contain information conveying the professional nature of the job. Even locally advertised posts should convey this information.

9.4 Temporary technicians

Temporary science technicians may need to be appointed for a variety of reasons. These include:

- *during long-term sickness;*
- *to provide cover for maternity leave;*
- *to provide cover whilst advertising a permanent vacancy;*
- *to provide cover for a technician on unpaid leave;*
- *to provide cover for a technician on secondment;*
- *other special circumstances (eg, short-term projects, organising and restocking a new science block, etc).*

When temporary science technicians are required, they are often needed quickly. For this reason, they are usually best recruited by word of mouth or using local newspapers. It will be very difficult to recruit experienced and skilled technicians for short-term contracts. Therefore, it

is extremely important for temporary technicians to undergo induction, especially in health & safety matters, and for them to be supervised at all times.

If sixth-form students are employed to provide temporary cover for science technicians, they must be fully supervised and regarded as trainee technicians (see section 4.2). They should also undergo induction training (see section 7.5).

9.5 Starting the job

A new technician should receive a contract of employment, a job description and copies of the establishment's, employer's and the science department's policies and procedures (in particular, the health & safety policies).

They should be told if there is a probationary period and, if so, the length of it (usually 6 months).

All new science technicians (inexperienced **and** experienced) should undergo a period of induction. They should receive training in health & safety, and instruction and training in all technician activities. In particular, training and instruction must be received **before** experienced and inexperienced new technicians are allowed to perform any tasks that involve inherent risks. They should be informed of the whereabouts of, and shown, the science department's safety publications such as:

- Hazcards (CLEAPSS);
- Recipe Cards (CLEAPSS);
- *Laboratory Handbook* (CLEAPSS);
- *CLEAPSS Science Publications CD-ROM*;
- *Safety in Science Education* (DfES);
- *Hazardous Chemicals: a Manual for Science Education (or CD-ROM)* (SSERC);
- *Safeguards in the School Laboratory* (ASE);
- *Topics in Safety* (ASE).

They should be informed how to consult model risk assessments and told that these must be consulted **before** performing any hazardous activity.

Induction is important not only for those science technicians who are completely new to the job, but also for experienced school / college technicians starting work in a new establishment and experienced technicians who have not worked in a school / college before.

Science technicians' induction is discussed fully in the CLEAPSS Guide G234, *Induction and Training of Science Technicians*.