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Introduction:

The provision of a high quality, world class science education is acknowledged by all partners in science education as being a key requisite for the students of this country. It is also one of the primary aims of the Irish Science Teachers' Association. This voluntary association established in 1961, recognises that there are many aspects to ensuring that such provision occurs. These include:

- the ongoing delivery of in-service to all science teachers
- the implementation of relevant, modern syllabi
- the ongoing provision of required resources for laboratories
- the employment of laboratory technicians.

The ISTA acknowledges that progress has been made in all of these areas with the singular exception of the provision of laboratory technicians. This continues to be the case, despite recommendations from a number of sources, including the 2002 Task Force on the Physical Sciences, the 2006 PISA report "Ready for Tomorrow's World" (teacher's response) and the ASTI Survey of science teachers in 2006.

The Association believes that students require meaningful practical work in conjunction with the relevant theory. This would maximise the quality of learning and understanding and the value of science as a subject. Science students must be presented with sufficient safe, working equipment for all practical work. This would best be provided with the presence of a laboratory technician, leaving the teacher to focus on teaching the necessary concepts.

This document details the reasons why laboratory technicians are essential and gives an analysis of the current situation.

Recent Curriculum Developments:

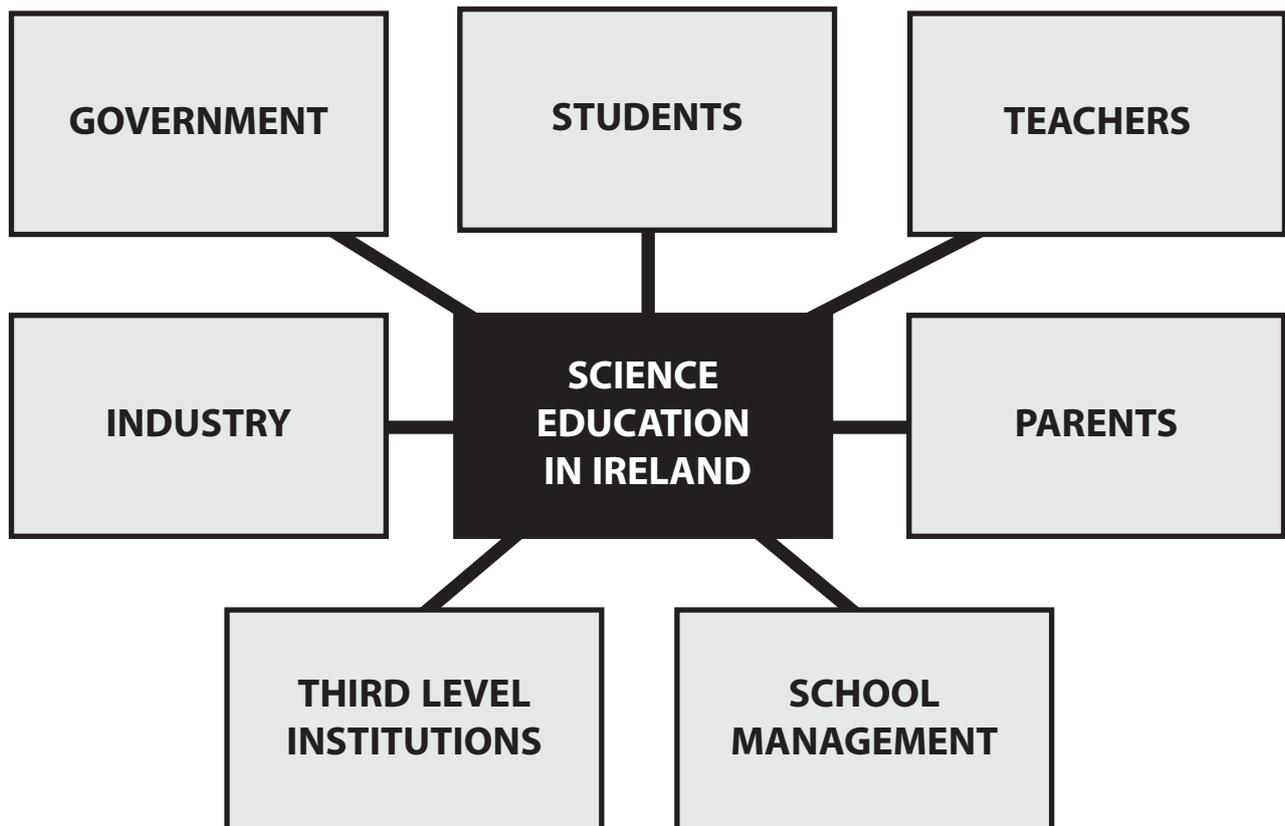
The three main science subjects at both junior and senior cycle level have been revised in recent years. Both the Leaving Certificate Chemistry and Physics were first examined in 2002, Biology in 2003 and Junior Science in 2007. There is a much greater emphasis on practical work, with students being required to complete mandatory experiments in all subjects e.g. at higher level there are 24 in Physics, 28 in Chemistry, 24 in Biology and 30 in Junior Science. In addition, there are Coursework B assignments at Junior Science, as well as the integration and use of technology, by students, in their learning. **Appendix 1 Subject Summary**

Currently, 4% of second level schools (26 out of 720 approx.) in the Republic of Ireland have laboratory technicians employed. This contrasts sharply with Northern Ireland, where all second level schools employ technicians and they are paid by Government. Many schools in Northern Ireland have a technician specifically assigned to each main science discipline. **Appendix 2 Resourcing Formula**

In a survey carried out of some Principals of schools who have laboratory technicians, a number stated that the presence of a laboratory technician has led to "greater efficiencies within the science department" in terms of planning, maximising use of laboratory time and resources etc.

Implications:

The following schematic highlights all those that are affected by this issue, i.e. second – level students, parents, science teachers, third-level colleges (particularly the science, engineering, medical and ICT departments), industry and Government. In this document, the focus is placed on students, teachers and second level education.



Students:

It is widely accepted that discovery learning is more stimulating for students. Having a technician will provide greater opportunity for students to participate fully and capably in investigative work. Valuable time can be lost by students as teachers have to prepare the science laboratory for the varied series of experiments and investigations conducted there. This can take up to 20 minutes in a single or double class period.

It has been observed in schools that have laboratory technicians that a greater number of students participate in extra project work such as the B.T. Young Scientist, Scifest etc.

Science Teachers:

In the 2006 PISA report "Ready for Tomorrow's World" (teacher's response), 71% of the 688 teachers surveyed cited lack of technical assistance as the greatest impediment to effective science teaching. In the ASTI's 2006 survey of 311 science teachers, the provision of technicians is highlighted as the single most needed resource in science education – with 91% of respondents indicating this level of need. Over 90% of teachers agreed that having a technician would enable them place more emphasis on practical work in their teaching, spend more time teaching, make practical work more enjoyable for students and enable them to diversify strategies in class.

Science teachers currently hold 2 positions: teacher and laboratory technician. They teach and facilitate learning like all other subject teachers, but they are also fulfilling the role and functions of a laboratory technician. It is worth noting what Baird (1996) lists as the functions of a laboratory technician:

- To maintain a safe working environment;
- To maintain supplies of resources;
- To service the laboratory and related areas;
- To support the learning process;
- To manage self and others.

In attached **Appendices 3 and 4**, the Association sets out a draft job description and specification for a laboratory technician. While this job description is not prescriptive, it gives a broad outline of what the ISTA sees as the basic requirements of a sole laboratory technician in a second level school.

It has been noted previously that mandatory experiments and investigative work at Junior cycle, mandatory experiments in Senior cycle have all been introduced in recent years. However, the essential supports for students and teachers, in the science laboratories, were not provided. This has had the knock-on effect of increasing the work load and pressures on science teachers significantly. Proposals re a mode of practical assessment at senior level will exacerbate this situation further.

The issue of Health and Safety in schools is now of paramount importance with legislation demanding extensive paper work, safe storage/disposal of equipment and chemicals along with detailed safety statements all leading to major changes to safety procedures in school science laboratories. The employment of laboratory technicians will further assist in the implementation of relevant Health and Safety standards.

Third Level Education:

Third-level colleges have stated that "poor up-take of senior level science subjects – particularly Chemistry and Physics – is having an impact on the intake of students to science courses at third-level and hence the follow-on numbers available for research and development. A poor quality experience of practical work can be a significant factor in turning students off science. The existing resources and facilities are not being utilised effectively because of the time pressures on science teachers to both teach and act as science technicians".

Industry:

Pharmaceutical Ireland has stated that “it believes that there is an urgent need to invest in laboratories and also to provide technicians support to run these labs as is the case in the third-level or indeed in industry.” The IBEC response to the Department of Education and Science consultation on its statement of strategy 2008 – 2010 states that “There is an urgent need for the DES strategy to fund the appointment of lab assistants in the schools.”

Policy Support:

It should be noted that the following bodies have highlighted the need for laboratory technicians at various times in the recent past.

- The Irish Science Teachers’ Association
- The Task Force on the Physical Sciences(2002)
- ICSTI(1999)
- The Green Party – 50 Steps to a Better Education System(General Election 2007)
- Fine Gael and Labour Joint Policy Document(General Election 2007)

The following organisations have specifically supported the ISTA policy for the employment of laboratory technicians in all second level schools in this country.

- The National Parents Council post primary
- The Teachers Union of Ireland
- The Association of Secondary Teachers of Ireland
- The Institutes of Physics, Chemistry and Biology
- Pharmaceutical Ireland (IBEC)

(Enc. Appendix 5)

The Irish Science Teacher’s Association advocates:

1. Provision of Laboratory technicians for all second-level schools.

2. The establishment of a National Science Support and Advisory Body similar to that of CLEAPSS and SSERC in Great Britain.

(Appendix 6)

SECOND LEVEL SCIENCE EDUCATION IN IRELAND

LEVEL	SUBJECT	ASSESSMENT		
Junior Certificate	Science – revised syllabus	<p>Coursework A 30 Mandatory experiments. 10 each from Biology/Chemistry/Physics</p> <p>Marks: 10%</p>	<p>Coursework B 2 of 3 practical investigations, 1 each from Biology/Chemistry/Physics</p> <p>Marks: 25%</p>	<p>Written Terminal examination Section 1: Biology Section 2: Chemistry Section 3: Physics</p> <p>Marks: 65%</p>
Leaving Certificate	Biology	<p>22 Mandatory experiments specifically examined in Section B of terminal examination – 15%</p> <p>May also be examined in Section C</p>		<p>Written Terminal examination</p>
Leaving Certificate	Chemistry	<p>21 Mandatory experiments at Ordinary level 28 Mandatory experiments at Higher level specifically examined in Section A of terminal examination – 25%</p> <p>May also be examined in Section B</p>		<p>Written Terminal examination</p>
Leaving Certificate	Physics	<p>22 Mandatory experiments at Ordinary level 24 Mandatory experiments at Higher level specifically examined in Section A of terminal examination – 30%</p> <p>May also be examined in Section B</p>		<p>Written Terminal examination</p>
Leaving Certificate	Physics/Chemistry	New syllabus pending		
Leaving Certificate	Agricultural Science	New syllabus pending		

RESOURCING FORMULAE

SOURCE:

- Survey of Science Technicians in Schools and Colleges
- Carried out by The Royal Society and the Association for Science Education
- July 2001

Previous Practice

According to CLEAPSS, the School Science Service, the standard working week for technicians is 37 hours. It is normal to refer to 'full-time equivalent' (fte) technicians.

For example if there are 3 technicians working a total of 55.5 hours per week in a school then that is $55.5/37 = 1.5\text{fte}$.

Prior to the establishment of OFSTED it was considered "that there was serious under-provision if there were fewer than 1 technician (fte) for 3 laboratories." (CLEAPSS, 1999, p1). In the past the ILEA allocated 1 technician (fte) per 2 laboratories, rounding down for odd numbers.

Resourcing Formulae

In the 1990 ASE report the following formula, which "should be capable of adequately delivering the functions" outlined in Table 1 above, is given:

$$\text{Number of Technicians} = \frac{\text{Total science teaching periods per week}}{1.6 \times \text{Number of periods per week}}$$

The figure of 1.6 is called the 'service factor'.

For example, In a school where there are 40 periods per week and 3 staff who teach 35 periods each, one who teaches 30 periods per week and one who teaches 25 periods, the above formula gives:

$$\text{Number of technicians} = \frac{160}{1.6 \times 40} = 2.5\text{fte}$$

An alternative formula is the following:

$$\text{Total Technician Hours per Week} = \text{Total Science Teaching Hours per Week} \times 0.85$$

In the above example, assuming that a period is 35minutes:

$$\begin{aligned} \text{Total Technician Hours per week} &= 160 \times 35 \times 0.85/60 \\ &= 79.33 \\ &= 2.14\text{fte} \end{aligned}$$

It is clear that varying the 'service factor' effects the number of full-time equivalents employed and consequently how good a technician service is provided. Research has been done on what level of service can be provided with varying service factor levels.

APPENDIX 2 cont.

The following table, Table 3, shows decreasing adequacy of provision.

Number of Technicians	Technician Hours per Week	Level	Comment
TTP/1.6n	TTH x 0.85	1	Recommended level
TTP/2n	TTH x 0.7	2	Decreasing Adequacy of Provision
TTP/2.4n	TTH x 0.6	3	Decreasing Adequacy of Provision
TTP/3n	TTH x 0.45	4	Decreasing Adequacy of Provision

Table 3

The 1990 ASE report describes the quality of technician function corresponding to each of the four service factors above as follows:

Level 1

“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 outlined in Table 1 above are feasible including the accessing of training and developing opportunities to meet the schools changing needs.”

Level 2

“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 and development and direct support activities.”

Level 3

“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 design and 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 to maintain the service.”

Level 4

“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 may be impaired. A supervisory structure for the less experienced may have to be provided from elsewhere. Regular training will be essential but difficult to accommodate.”

Main Responsibilities:

1. Preparation and distribution of such equipment and solutions required for experimental work for all levels up to Leaving Certificate.
2. Overall coordination of the laboratories and preparation rooms.
3. Communication with the Head of Science Dept. and staff.
4. Stock control of equipment, chemicals and resources.

Main duties:

1. Responsible, together with the head of the Science Dept., for setting and implementing objectives and policies for the Science laboratories.
2. Responsible for the organisation and day to day running of the laboratories by developing an effective routine for all necessary activities thereby ensuring provisions of essential equipment and chemicals for the science classes in addition to all necessary Health and Safety equipment
3. Responsible with the Head of Dept. for devising, implementing and observing all procedures as required in terms of Health and Safety legislation and compliance with the school science Health and safety statement
4. Keep up-to-date records as necessary and as agreed , including the following:
 - a. An inventory of science equipment and chemicals.
 - b. Material Safety data sheets
 - c. Major Breakages and essential repairs.
5. Responsible for chemicals and equipment e.g. ordering and safe storage, preparation, dismantling, repairs, maintaining bulk supplies of stock solutions, disposal of solutions etc.
6. Attend such meetings and in-service training courses as are necessary to keep up-to-date with developments in the area of both science curricula and Laboratory maintenance.
7. Liaising /attending staff meetings with the Head of Dept. and staff members in planning, implementing and reviewing all term and yearly programmes in order to maximise usage of the science laboratories and equipment.
8. Set up/implement a communication framework with staff members in order to gain the necessary information re practical work schedules for all science teachers.
9. Carry out routine maintenance of laboratories and schedule large-scale repairs/maintenance for holidays etc.
10. Responsible with the Head of Dept for the science budget and allocation of same to the purchasing of equipment, processing invoices and maintaining good records of expenditure etc.
11. Working with the Head of Dept. and staff, the Laboratory technician should assist with any special projects, field trips, outings and visits.
12. Carry out any other duties as directed by the Head of Dept. or School Principal.

SAMPLE JOB SPECIFICATION :

SCHOOL LABORATORY TECHNICIAN

Education and Qualifications:

1. Recognised laboratory technician qualification essential - *Other recognised Science qualifications may be considered where evidence of equivalent level of education is provided including required Health and Safety training.*
2. Appropriate First aid qualification essential.
3. A computer/administration qualification desirable.

Previous Work Experience:

- 3 years experience of working in a related area essential.
- Experience of record-keeping and report-writing essential.
- Experience of reviewing/evaluating programmes of activity essential.
- Experience of working as part of a team essential.
- Experience of working with and relating to management desirable.
- Experience of working with and relating to students desirable.
- Experience of reviewing/evaluating Policies and Procedures desirable.

Personal Qualities:

- Good verbal and written communication skills.
- Good interpersonal and team-working skills.
- Proven time-management skills.
- Ability to work on own initiative.
- Interest in further learning and training.
- Reliable and flexible.

SUPPORTING DOCUMENTATION

National Parents Council pp
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Ballyboggan Road
Dublin 11



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Locall: 1890 672770
e-mail: npcpp@eircom.net
Website: npcpp.ie

Mr. Pdraig O Leime,
Convenor Laboratory Technicians,
Sub Committee,
Bavin,
Kilcar,
Co. Donegal.

25th February 2008.

Dera Mr O' Leime,

The Executive of the National Parent Council, post primary at its last meeting passed a motion of support for the employment of Laboratory Technicians in second level schools.

Employing qualified Laboratory Technicians will ensure that the laboratories will be efficiently run, and that students will have a safe working environment.

It is of the greatest importance that students have hands-on experience as with the changes in the Science syllabus it is now necessary that they have practical experience in a laboratory setting.

Employing Laboratory Technicians will free up time for the teacher and ensure that the laboratory experiments are prepared in advance for the students. The Laboratory Technician will also be responsible for the efficient running of the laboratory and for maintaining of equipment and ordering supplies.

The National Parent Council, post primary, fully endorses the employment of Laboratory Technicians in second level schools.

Yours faithfully,

Humphrey O' Riordan,
President, NPCpp

NPCpp – Working towards a better education system for all

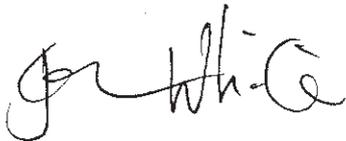
Ms Yvonne Higgins
Honorary Secretary
Irish Science Teachers Association
Ballintogher PO
Co Sligo

RE: ISTA Laboratory Technicians Campaign

Friday, 14 March 2008

I write with reference to the recent meeting between your Association and the ASTI on the subject of Laboratory Technicians to assist in the delivery of Science education in schools. At this meeting, common concerns were expressed in relation to the lack of progress in securing a commitment from the Minister for Education and Science for the provision of this resource in schools. The need for this resource is increasingly evident to all who are familiar with the teaching of science in schools. The ASTI is highly supportive of the work underway by the ISTA on this issue and is happy to formally add its voice in support of that work.

With every good wish,



JOHN WHITE
General Secretary

Pádraig Ó Léime
Laboratory Technicians Sub-Committee
Irish Science Teachers' Association
Bavin
Kilcar
Co. Donegal

17th May 2007

Dear Pádraig,

I am writing to you on behalf of the Institute of Physics in Ireland to express our support for the ISTA's campaign for laboratory technicians in all second level schools. As you know, this measure was called for in the 2002 Report of the Taskforce on Physical Sciences and the Institute has made representations on this matter on many occasions to the Dept. of Education and Science. We believe it is an essential component to the teaching of science in schools.

The Institute wishes you every success with the campaign and if I can help in any way, please do not hesitate to contact me.

Yours sincerely,



Dr. Sheila Gilheany



Statement re: laboratory technicians in schools

Pharmaceutical Ireland, a sector within IBEC, representing the needs of the pharmaceutical and chemical industries in Ireland lends its full support to the Irish Science Teachers Association's call for technical support in the classroom.

PharmaChemical Ireland remains convinced that there is a need for significant investment in the teaching of science at second level. PharmaChemical Ireland strongly advocates the immediate implementation of the recommendations of the Task Force on Physical Sciences. It believes that there is an urgent need to invest in laboratories and also to provide technician support to run these labs as is the case in the third level or indeed in industry.

Secondary schools are where Ireland's young minds are first exposed, to a serious degree, in the sciences. The heartbeat of the science subjects lies in its practicality. The lack of technical support seriously undermines the students ability to carry out the practical elements of the course, leaving the student at best, to watch the teacher demonstrating the experiment, or at worst, reading about it. Both of these scenarios need to be a thing of the past, especially if Ireland wishes to build the knowledge based economy which so heavily relies on the quality science graduates produced by our learning institutions.

PharmaChemical Ireland urges the Department to seriously consider the implications of a lack of funding, not only in the immediate term to our schools, but in the longer term to the scientific industries who will suffer from a lack of quality science graduates.





**The Institute of
Biology of Ireland**

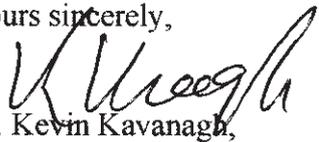
Institiúid Bítheolaíochta na hÉireann

University College Dublin,
Belfield, Dublin 4.
Email; ibi@may.ie
Web site; <http://www.may.ie/ibi/>

Dear Minister,

We, in the Institute of Biology of Ireland, are concerned about the health of science in Ireland and believe that science education in schools is crucial to any knowledge-based economy. The relative lack of interest in science in schools, particularly in physics and chemistry, has an impact on third level enrolment in science, and hence on the number and quality of students doing postgraduate research (fourth level). Provision of suitable laboratory-based practical experiences in science is essential if students are to be attracted into science. We support the campaign by the Irish Science Teacher's Association to provide science laboratory technicians in schools. The existing resources and facilities are not being utilised effectively because of the time-pressures on science teachers to both teach and act as science technicians. Wherever schools have managed to raise the funding for a full-time or part-time science technician this has revolutionised their teaching of science. We would like this improved experience of science education to be available to all Irish second level students. Poor experience of practical work in schools is a significant factor in turning students off science. Investment in laboratories, resources and ICT will be largely wasted unless there is the technical back-up in schools to utilise these properly, something that is absent at present in the majority of Irish schools. Provision of science technicians was one of the major recommendations of the Task Force on the Physical Sciences (2002), and this has been supported since by many other bodies. We would like to add our professional voice in support of this campaign for science technicians. It is an essential element in any strategy to increase the numbers doing science at second and third level, and going on to work in research and industry. We need to invest in science education in schools if we are to achieve our national objectives for a knowledge-based economy.

Yours sincerely,


Dr. Kevin Kavanagh,
Chairman,
Institute of Biology of Ireland

22.6.07



Mr. Séamus Ó Donghaile,
Irish Science Teachers Association,
Lios Dubh,
Cluann na gCloidhe
Co Roscomáin.

5 May 2008

Dear Séamus,

The decline in the number of students opting to study science at second level is a major concern to the TUI. The provision of facilities that enable second level students to enjoy a "hands on" approach would help to arrest this fall-off in demand. TUI believes the appointment of laboratory assistants would ensure that teacher time is freed up to engage in the teaching and learning process, thus maximising the benefit of class and preparation time to students. The Department's failure to move on the recommendations of the Task Force on the Physical Sciences in relation to laboratory technicians shows an appalling lack of commitment on the part of the Government to increasing the numbers taking science subjects at second level.

Second-level teachers are willing and anxious to build and improve science education in our schools. The NCCA are now investigating the introduction of a second mode of assessment in all science subjects, a mode that rewards practical work. This new mode of assessment would make science education more relevant and attractive to young people. TUI believes this is a welcome innovation, but only if properly resourced and supported. The provision of laboratory technicians to support preparation tasks, experimentation work and other activities such as stocktaking, managing chemicals and ensuring health and safety of students is essential to support the quality of science teaching in our schools.

The Fianna Fail election manifesto of 2007 states that in government it will "Ring fence funding for science laboratories, improve science equipment in our schools and ensure a greater focus on high quality science education at all levels". To deliver on this election promise of ensuring high quality science education at second level they must now provide a laboratory technician to all second level schools with science laboratories.

Yours truly,

Tim O'Meara
President

Source: CLEAPSS Website

What is CLEAPSS?

CLEAPSS® is:

- a nationwide advisory service for subscribers,
- for practical science and technology,
- for schools and colleges (including special schools, referral units, etc),
- able to help from nursery education through to A-level or equivalent.

CLEAPSS serves:

- teachers (including head teachers),
- technicians,
- science advisers/inspectors/consultants,
- teacher trainers,
- health and safety advisers,
- architects (working for subscribers),
- other local authority officers,
- school governors.

CLEAPSS covers:

- health and safety including risk assessment,
- chemicals, living organisms, equipment,
- sources of resources,
- laboratory design, facilities and fittings,
- technicians and their jobs,
- some D&T facilities and fittings.

CLEAPSS provides support for a consortium of local authorities. It is controlled by its members, ie:

- 180 LEAs throughout the British Isles (not Scotland), ie, 100% of those eligible.

It has around 2000 associate members, ie:

- foundation and voluntary-aided schools (where not a member via a local authority),
- independent schools,
- incorporated colleges,
- teacher-training establishments and science learning centres,
- overseas institutions,
- field centres, museums, etc,
- curriculum developers.

CLEAPSS provides:

- termly newsletters for primary and secondary schools,
- a range of publications, mostly free (see below),
- model risk assessments,
- special risk assessments,
- low-cost training courses for technicians, teachers and local authority officers,
- a telephone **Helpline** which takes almost 7000 calls per year,
- a monitoring service, eg, for mercury spills,
- evaluations of equipment,
- discounts from some suppliers,
- advice on repairs.

Publications include:

- Hazcards[®],
- CLEAPSS Laboratory Handbook,
- Model Risk Assessments for Design and Technology in Secondary Schools,
- CD-ROMs of Science and Design & Technology publications,
- Recipe Cards,
- Student Safety Sheets,
- Guides on over a hundred specialist topics such as:

Fume Cupboard Datasheets,
Small Mammals,
Magnets for Primary Schools,
Designing and Planning Laboratories,
Glues and Adhesives,
Science for Secondary-aged Pupils with Special Educational Needs,
Technicians and Their Jobs,
Running a Prep Room.

The training courses include:

- general health and safety,
- basic skills for technicians,
- microscope maintenance,
- chemical handling,
- electrical safety testing, basic electricity, basic electronics,
- making simple equipment,
- microbiology,
- safety management (for heads of departments),
- radiation protection supervisor training,
- safety in primary science

APPENDIX 6 cont.

CLEAPSS also works in a less-visible manner to support practical science and technology. In particular, CLEAPSS is currently or has recently been:

- acting as an expert witness in both criminal and civil court cases; working with the Royal Society, the ASE and others to develop a career structure for school science technicians;
- working with the national Science Learning Centre and Regional Centres;
- collaborating with the Royal Society, the ASE, the DfES and others to develop guidance for schools on laboratory design;
- producing reports for the Royal Society of Chemistry on health & safety myths in science and on the mismatch between the equipment and laboratories needed to teach science in a modern way and what happens in practice;
- working with the Health and Safety Executive and the Environment Agency on matters of mutual concern, eg, the disposal of surplus radioactive sources;
- working with QCA to advise on the health and safety implications of Schemes of Work and assessment materials;
- working with manufacturers & suppliers - to keep abreast of latest developments, to find sources of unusual chemicals/equipment, to advise on their healthy and safe use in schools;
- working with publishers and television producers to ensure healthy and safe practices are described and/or shown;
- supporting curriculum developers, including 21st Century Science, Nuffield, the Salters' Institute and the Gatsby Science Enhancement Programme, with proposed practical activities;
- aiding curriculum development in safety by preparing Student Safety Sheets to support the teaching of the health & safety aspects included in the Science National Curriculum;
- represented on various British Standards committees (eg, fume cupboards, eye protection, health and safety in school workshops) to ensure standards are appropriate to the needs of school science and technology;
- demonstrating safe but exciting practical techniques on Teachers' TV.