Science & Technology Equipment News

For Primary Schools and Teachers of S1/S2 courses

Helpline 0131 558 8180 e-mail sts@sserc.org.uk Faxline 0131 558 8191

STS National Support Services in **Science, Technology and Safety**

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Number 18
September 1999
ISSN 1369-9962

Science Online Support Network

This is something of a bumper issue. This should, in part at least, help make up for the loss of a Winter issue earlier in the year. It should also demonstrate that we haven't been idle. We devote this issue to describing a Science Online Project intended to assist teachers in Primary schools teaching science as part of their 5-14 Environmental Studies programmes. We describe the background to and the aims of the pilot project with ten Primaries and one secondary school. We also provide a foretaste of what should be available more widely as increasing numbers of schools get connected to the Internet.

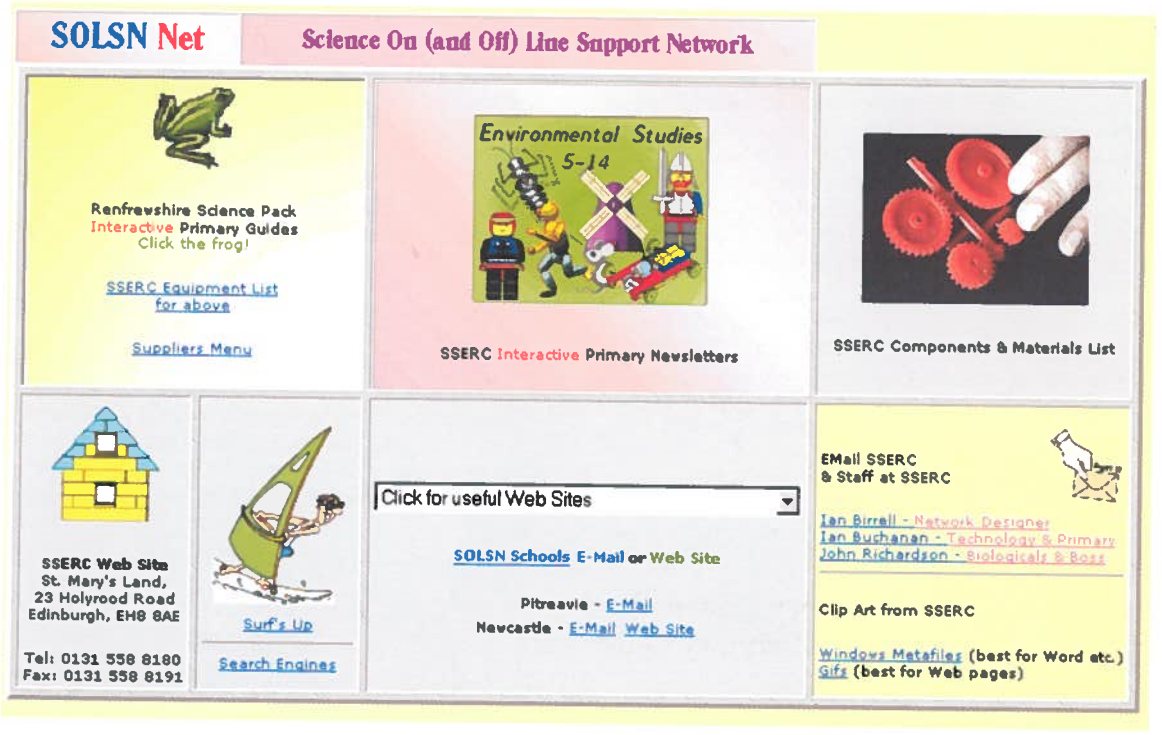


Figure 1 Introductory screen for latest pilot version of SOLSN currently being trialled on a CD ROM

Over the last couple of years or so the Centre has been heavily involved in assisting in the development of a Scottish support network for Primary science (SOLSN). The project began as a feasibility study managed by the Scottish Interactive Technology Centre (SITC) at Moray House Institute of Education. We are currently looking after the second part of the Pilot phase. Like the feasibility study it continues to be a collaborative exercise. SOLSN is being developed by a consortium the other partners in which are : the Scottish Executive Education Department (SEED); City of Edinburgh; Fife and West Lothian Councils.

Latterly Renfrewshire Council has become involved by generously allowing the use of some curricular support materials developed by a group of its teachers. In the early stages SOLSN was an on-line site. This was a 'closed' network - an intranet - accessible only to teachers in the trial schools and those assisting the project ('helpers') from elsewhere. It was interactive in the sense that assistance and advice was available via e-mail from designated helpers in EAs, Institutes of Initial Teacher Education, a secondary school and here in SSERC.

cont./over

Project aims

In seeking to harness on-line information and communications technology to science education, the SOLSN Project has three major objectives. These are to:

- *support Scottish primary teachers to improve their own understanding of science, assisting them in their professional development and so*
- *seek to improve standards in the learning and teaching of science at the 5-14 level and to*
- *improve liaison and continuity in the experiences of pupils across the primary and early secondary stages.*

On-line use, however, so far has proved somewhat problematic. This is because of access problems, particularly in the Primary schools. These access difficulties are both technical, in the sense of unreliable or very slow Internet and e-mail facilities, and physical, in the sense of inconvenient physical locations for computers with access to the internet. Training, or more accurately the lack of it, was another source of difficulty for the teachers. Despite all of these problems the evaluation results suggest that primary practitioners still see considerable potential for this sort of electronic resource as part of a practical support network for teachers.

Off-line - for now

This combination, of promise on the one hand and technical or other blocks to progress on the other, has led the SOLSN Steering Group and the SSERC project team into the current phase of development. Because on-line access, meantime, appears problematic the support has been shifted partly off-line. It is being provided by means of a CD ROM version of the site together with advice and help by e-mail, telephone, fax or other means whichever proves most convenient. The contents of the CD ROM still use web based techniques and you can 'surf' through the collection of resources using a browser such as Netscape Navigator or Internet Explorer.

At the time of writing, the results from the first evaluation of the CD by trial schools have been taken into account in developing a second edition. Following on a training session for the pilot schools, over a hundred copies of the revised edition of the CD will go on extended trial this Autumn.

Figure 2 'Hot linked' frog, gives access to a set of science lesson planning tools

Figure 1, on the front page of this issue, shows the introductory menu screen for the current version of SOLSN. A key component of the site is denoted by the *Wee Frog* logo (Figure 2 above).

Behind this logo is a link to a set of lesson planning tools which were developed from the *Renfrewshire Science Pack* for 5-14 Environmental Studies. This was included as a specific response to requests from teachers in the pilot schools. The site now pivots about this feature. Using web browser techniques this articulates a curricular framework for P1 through to P7 with both the Renfrewshire Pack and a collection of other resources.

In the earlier site, such resources were in a variety of locations such as a *library*, a *prep room etc*. Figure 3 below shows the opening screen for the interactive version of the Science Pack. This part of the CD is fairly obviously based on the science Attainment Outcomes and Key Features of the 5-14 Guidelines for Environmental Studies. It is these Attainment Outcomes and Key Features which lend progression to the site. Each is set up as a hot link to the next part of the site wherein it occurs. Within an attainment outcome area for any particular year, the key feature links take you to an equipment list for the resources needed to carry out any practical activities and investigations.

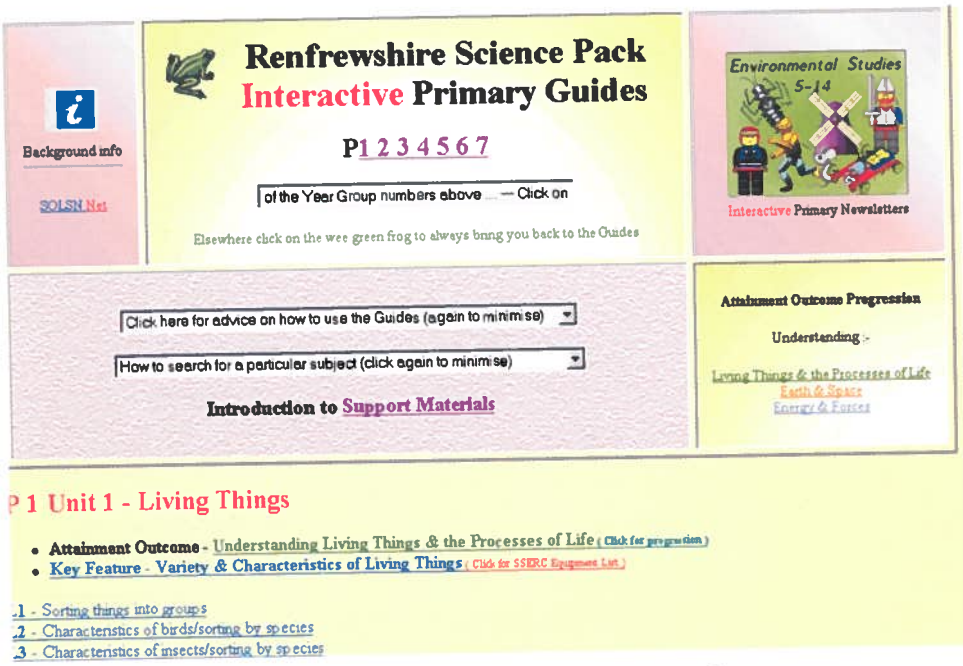


Figure 3

Note hot links to attainment outcomes in other years and to individual lesson plans. Key features are linked also - to equipment information. Figures 4 and 5 opposite also illustrate these aspects of the 'site'.

An example of one lesson plan (for Primary 3) is shown on the facing page as Figure 6.

P 1 Unit 1 - Living Things

- **Attainment Outcome** - Understanding Living Things & the Processes of Life (Click for progression)
- Key Feature - Variety & Characteristics of Living Things (Click for SSERC Equipment List)

L1 - Sorting things into groups
L2 - Characteristics of birds/sorting by species
L3 - Characteristics of insects/sorting by species
L4 - Identifying common plant species
L5 - Growing plants
L6 - Human characteristics

P 1 Unit 2 - Common Materials & their Uses

- **Attainment Outcome** - Understanding Earth & Space (Click for progression)
- Key Feature - The Material Resources of the Earth (Click for SSERC Equipment List)

L1 - Naming common materials
L2 - Uses of common materials
L3 - Properties of common materials

P 1 Unit 3 - Heat, Sound & Light

- **Attainment Outcome** - Understanding Energy & Forces (Click for progression)
- Key Feature - Forms & Sources of Energy

L1 - Heat energy
L2 - Sound energy
L3 - Light energy
L4 - Safety

Figure 4

Screen showing the first 3 Units for Primary 1. Note the three Attainment Outcomes are covered. For each Unit there are a number of possible lesson plans - see Fig. 5 below for part of the equivalent screen which loads for Primary 3 Unit 1. Figure 6 shows the sample Plan for P3 Unit 1 Lesson 4.

Figure 5

Screen with five lesson plans for P3 Unit 1. Mouse clicking on the hot link for Lesson 4 (L4) brings up the screen shown as Figure 6.

P 3 Unit 1 - Habitats & Seasonal Changes

- **Attainment Outcome** - Understanding Living Things & the Processes of Life
- Key Feature - Interaction of Living Things with their Environment

L1 - Habitats
L2 - Need for food
L3 - Caring for living things
L4 - Seasonal changes in appearance
L5 - Seasonal changes in behaviour

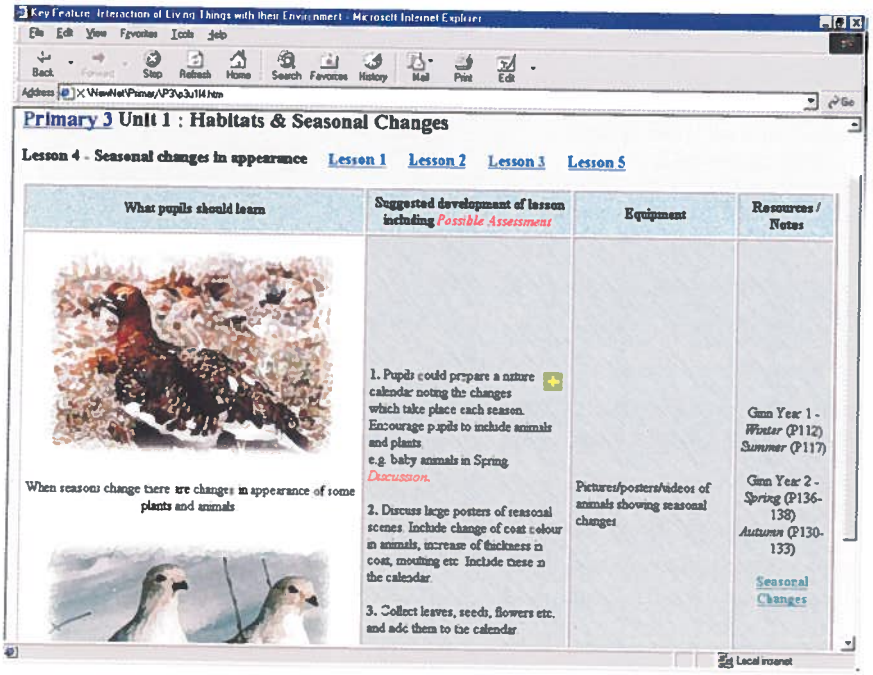


Figure 6 Part of the sample plan for Lesson 4 for P3 Unit 1. Lessons 1,2,3 and 5 are similarly hot linked and laid out in the same four column format. The first column covers Knowledge and Understanding; the second Suggested Learning Activities; the third indicates equipment (detailed if you mouse click on the Key Feature link) The fourth column points to other resources, some of which are Web based (some on the CD others 'live' on the Internet).

Other support materials

Eagle-eyed readers may have spotted the little 'plus sign' logo in the second column of the table in Figure 6. This indicates that there is additional support material available in the shape of teacher's notes, worksheets, tips etc. Clicking on the plus sign opens up more screens carrying such material. In this case it is a relatively simple reference (see Fig.7 opposite) back to relevant work in Primary 2. Other support references are more extensive and describe further activities. Some lead to workcards or sections of interactive versions of other publications.

Figure 7 Support material link out of second column. This kind of link may also lead to a downloadable workcard or other resource.

P3 - Interaction of Living Things with their Enviromnment

Equipment	No.	Supplier 1	Item Code	Item Cost (£)	Supplier 2	Item No.	Item Cost (£)	Comments
Habitats & seasonal changes								
Air pump		Hogg	S8300	18.7				Local pet shop
Buckets		Local						
Camera		Local						
Collection jars with lids	pack 2	TTS	STORJARM	2.45	Commotion	38076 172	6.99	Pack 12
Fish tank		TTS	LTANK	7.35	Commotion	34097 121	7.99	Commotion supplied with lid
Nesting box		Philip Harris	PH1748/9	15.37				Try DIY stores or pet shops
Plastic sweet jars	pack 2	TTS	STORJARL	2.2	Commotion	38033 172	5.99	Pack 4
Pond nets small	pack 6	TTS	TNET S	5.65	Commotion	34045 121	3.99	Pack 5
						34043		

Figure 8 Equipment list link from Key Feature statement of Primary 3, Unit 1. This is the link as shown at Figure 7 top.

Equipment

The third column of the table refers to simple equipment requirements. Somewhat more sophisticated is a series of links from the Key Feature shown for each Unit. Mouse clicking on these Key Feature links opens up a screen based on part of a SSERC Equipment List for the Science Pack. Figure 8 provides an example of such a screen.

Resources, notes

The fourth and final column of the lesson plan tables provides references to third party resources. These may be any of the following :

Simple non-interactive textual references eg to sections of commercially published resources such as those of Ginn;

Hot links to web based resources which have been captured and actually 'cached' on the CD ROM and

'Live' links to selected sites on the Internet, relevant to that particular section of work.

cont./right col.

The 'live' or online links to the net obviously only work if the computer is actually connected to the web in some way. This means that at times access may be slow or unreliable or occasionally the referenced site may have been moved and the link broken.

These live links thus have been colour coded to distinguish them from similar hot linked resources which reside on the CDROM. The offline links on the CD itself of course work without any such connection and speed of access is uninfluenced by traffic volume, unless the contents of the CD have been mounted on the server of a local network or intranet.

Typical offline links go to interactive versions of SSERC's 5-14 Newsletter and to *Try its* downloaded from an excellent site called Newton's Apple. *Tryits* are simple little practical activities and investigations designed to illustrate or explore science ideas. Because the site is intended to assist teachers' professional development there are also links to some of SCRE's research findings on teachers' understanding. These kinds of resources were once tucked away in the Library section of the original SOLSN site.

Other SOLSN features

Interactive newsletters

Although the Science Pack lesson planning tool is a central feature of the site, it is not its sole component. Also part of the CD is a set of interactive versions of earlier issues of this serial publication - the *Science and Technology Equipment News* (see Figures 9 and 10).

In these versions, the various parts of any one newsletter are hot linked the one to the other. In addition where it is relevant and useful to do so, parts of one newsletter may be linked to related sections of other issues.

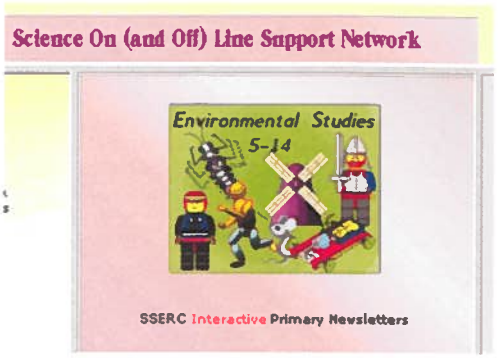


Figure 9 Icon link to electronic versions of newsletter

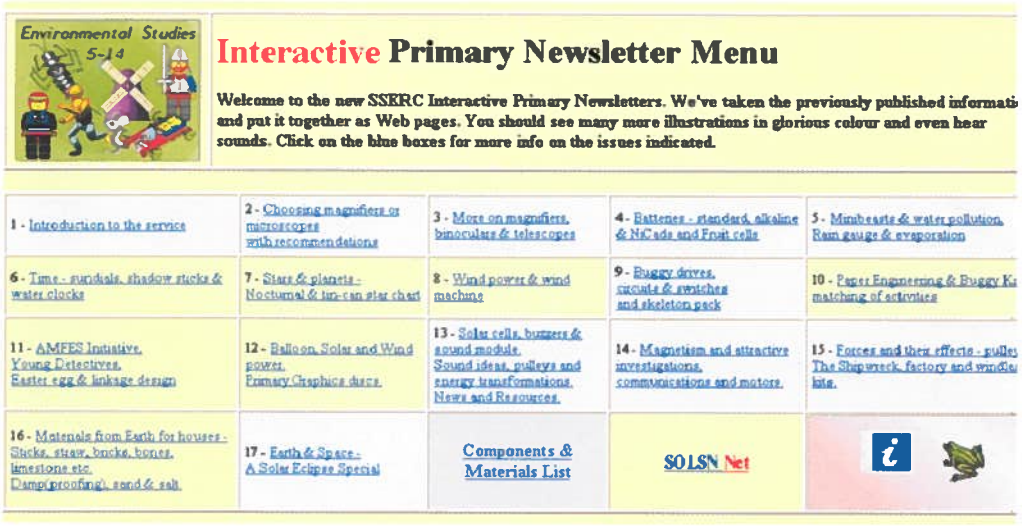


Figure 10 Newsletter menu

Surfer's guide

Many teachers are newcomers to the internet and to the use of web browsers. For those unsure of how to navigate their way around this type of resource collection, we have included a guide to surfing and some information on search engines (Figure 11 opposite). There is also a drop down menu of useful websites.

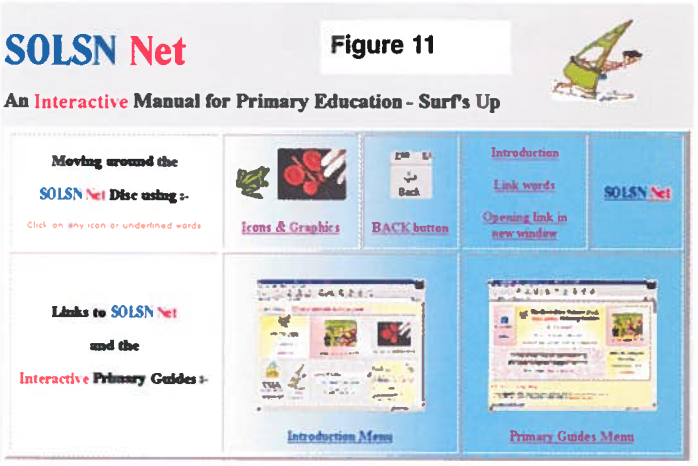
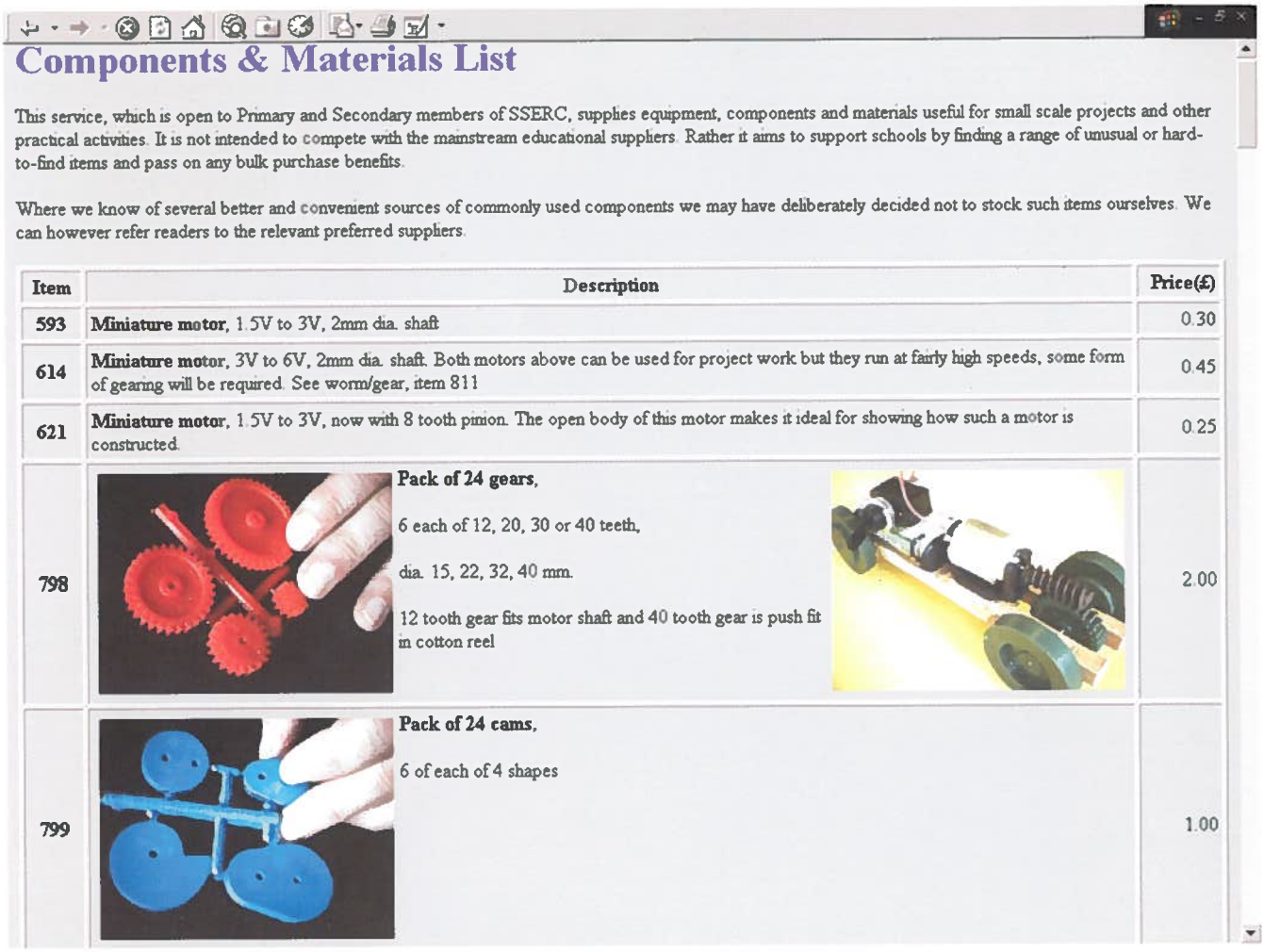


Figure 12 Links to components catalogue and e-mail

SSERC components and materials

Those who have ordered kits and components from us will, by now, be familiar with the lists which usually appear on the back page of the 'News'. Experience has suggested that some teachers are unsure of what some components are, what they look like or how they might be applied in projects or investigations.

With the recent availability of inexpensive imaging equipment (we use a QuickCam) it has proved possible to make up an illustrated list (see logo for this link in Figure 12). A copy of part of the print out from this section of the SOLSN site is shown on the next page. The whole listing will soon to be downloadable from our new website. The more conventional listing without illustrations is on the back page of this edition of the Science and Technology News.



Components & Materials List

This service, which is open to Primary and Secondary members of SSERC, supplies equipment, components and materials useful for small scale projects and other practical activities. It is not intended to compete with the mainstream educational suppliers. Rather it aims to support schools by finding a range of unusual or hard-to-find items and pass on any bulk purchase benefits.

Where we know of several better and convenient sources of commonly used components we may have deliberately decided not to stock such items ourselves. We can however refer readers to the relevant preferred suppliers.

Item	Description	Price(£)
593	**Miniature motor**, 1.5V to 3V, 2mm dia. shaft	0.30
614	**Miniature motor**, 3V to 6V, 2mm dia. shaft. Both motors above can be used for project work but they run at fairly high speeds, some form of gearing will be required. See worm/gear, item 811	0.45
621	**Miniature motor**, 1.5V to 3V, now with 8 tooth pinion. The open body of this motor makes it ideal for showing how such a motor is constructed.	0.25
798	**Pack of 24 gears,** 6 each of 12, 20, 30 or 40 teeth, dia. 15, 22, 32, 40 mm. 12 tooth gear fits motor shaft and 40 tooth gear is push fit in cotton reel	2.00
799	**Pack of 24 cams,** 6 of each of 4 shapes	1.00

Figure 13 Illustrated catalogue of components and materials for mini-projects and investigations. Images captured in web pages using an inexpensive digital camera.

Where do we go from here?

The next phase is the extended trialling of the second CD edition of the site. These offline trials will probably continue with a small number of pilot schools. Meantime, SSERC will continue to build its own expertise in setting up and running websites on our new, in-house servers. As with the feasibility study, the pilot phase is to be subject to an independent, external evaluation.

At some point, other components of the original SOLSN online site - which were valued by the teachers - will have to be reinstated and a new online version made available. These features would include those known as :

"The Cafè" a feature which allowed schools to ask online Helpers questions about science and science teaching at Primary level.

The "Prep Room" whereby different schools could submit samples of pupils' work and teachers' own planning tools, assessment models etc. and thereby share practice.

The "Forum" which was divided into two sections. One was the Helpers Forum where those supporting the site could discuss, in private, enquiries, ways of working etc and the General Forum wherein teachers could swap ideas and discuss ways of teaching science topics.

Implementation phase

Once the evaluation results are to hand and the feedback from teachers has been collated, the project may move to the next phase of wider implementation. Should the teachers give SOLSN the *thumbs down* then we shall have to either go back to the beginning or simply give up on the whole idea. Assuming that the evaluation and other feedback are favourable then the SOLSN model will be offered to other Scottish EAs and schools for implementation.

Scottish EAs will be able, if they wish, to implement SOLSN in whole or part in a variety of ways. Part or all of the material could be provided on CDROM and then mounted on intranets - either whole authority or school based. Updates could be accessed from time to time. These updates may be on CDROM (or in the future DVD - digital versatile disks) or accessed via a centrally maintained website then downloaded and cached locally.

SOLSN as a model

The project, if successful, will also have implications for other subjects, ages and stages. The SOLSN site pivots about curricular guidelines, deliberately referencing ICT resources to curricular contexts. This approach thus may well be of wider application elsewhere in Scottish education.

Environmentally friendly ICT?

Six pages of *virtual reality* ought to be more than enough for anyone. A major part of SOLSN is to do with suggestions and advice for practical science and technology. So, what can one do with all of those unwanted CDs for 'free' internet and e-mail access that seem to come with every magazine and supermarket visit? They gather on one's desk and may eventually cover it like some plastic plague. It's strangely fascinating. Like the wire coat-hangers which apparently breed in the wardrobe, where do all these CDs come from? What use are they?

Before car makers improved security, wire coathangers used to provide a good way of opening doors when the keys were still in the ignition. Interestingly, in creative and talented hands they can also be made into sculpture. There's a particularly fine example on show at the moment in the *Scotland's Art* Exhibition in Edinburgh. But CDs? They could, we suppose, be used as coasters (drink mats), or frisbees. We know that they are used by gardeners as bird scarers. They might be put to use as a colourful mobile (but always in someone else's bedroom). Perhaps children could be encouraged to suggest other uses. We're considering a '*one thousand ways to recycle unwanted CDs*' project. Here are a couple of the more successful initial ideas we built for fun but which are also instructive.

Green CD machine

Our buggy designs and kits are by now fairly weel kent. Lightweight CD wheels provide an interesting variation on the theme. In what passed for our young day of course, we used vinyl 78s on such models. Figure 14 (below right) shows a three-wheeled buggy powered from a solar cell and using a simple pulley drive to the CD wheels.

Is this the ultimate in environmentally friendly power sources? Eat your hearts out, Honda! It does have one or two obvious drawbacks. How could we travel during the night ? What happens on a cloudy day, will it still work?

Since it needs a suitable low current motor with a gearbox, it is a wee bit expensive for the bits (guide price £6.50). But then, it is reasonably easy to build. If you would like to build a Solar Buggy (CD model) please send a stamped and self-addressed A5 envelope and we will forward a parts list and construction details. You need to supply a glue suitable for plastics and your own surplus CDs! We know where plenty are to be had but it might bring trouble if we make the all too obvious suggestions.

CD clock

Figure 15 illustrates the use of an unwanted CD as the face for a simple, battery powered, clock. The model shown is on a simple wooden stand. If your craft skill's a wee bit shaky it is much simpler to make one to hang on a wall. We can supply all that is needed to assemble a wall clock. the cost for each kit is £3.00. For that you will get nearly all of the necessary parts and thereafter the clock is simple to build. A battery is included but not the unwanted CD - you shall have to source your own.

Figure 15 Clock with CD face.

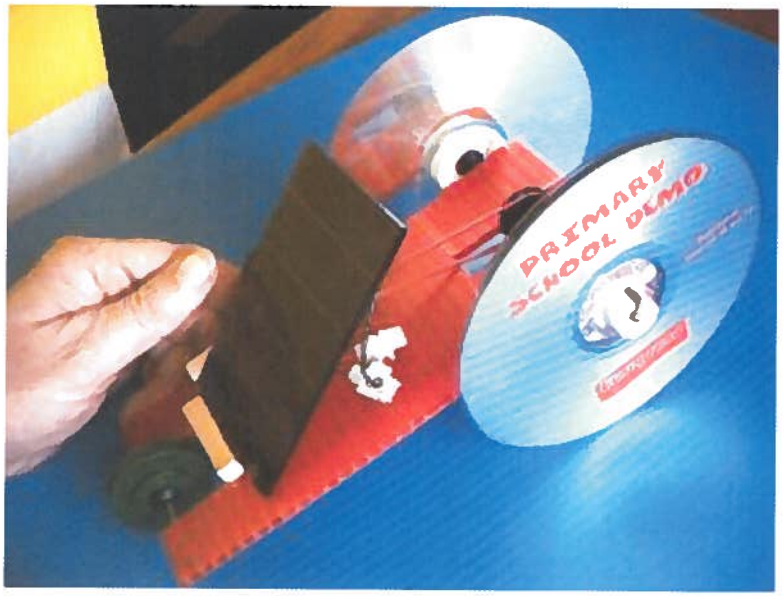


Figure 14

Solar buggy using unwanted CD ROMs for the wheels. The buggy platform or body is of Corriflute. Note the twin use of MES lampholders as both adaptors for large holes in the CDs and as the bearings. The solar cell is our item number 838.

Components & Materials

593 Miniature motor, 1.5V to 3V, 2mm dia. shaft ***30p***
614 Miniature motor, 3V to 6V, 2mm dia. shaft.
Both motors above can be used for project work but they run at fairly high speeds, some form of gearing will be required. See worm/gear, item 811 ***45p***

621 Miniature motor, 1.5V to 3V, now with 8 tooth pinion. The open body of this motor makes it ideal for showing how such a motor is constructed. ***25p***

798 Pack of 24 gears, 6 each of 12, 20, 30 or 40 teeth, dia. 15, 22, 32, 40 mm . 12 tooth gear fits motor shaft and 40 tooth gear is push fit in cotton reel ***£2.00***
799 Pack of 24 cams, 6 of each of 4 shapes ***£1.00***
800 Pack of 100 wheels, 39 mm diameter, assorted colours, 3 mm axle hole ***£5.25***
811 Worm and gear, gives a 34 to 1 speed reduction. ***35p***
817 Axles 3 mm dia.,nickel plated, round ends. push fit on SSERC plastic wheels, gears and pulleys: 70 mm long, per pack of 4 ***40p***
818 As above but 95mm long, pack of 4 ***40p***
819 As above but 120mm long, pack of 4 ***40p***

820 Worms to fit 2mm electric motor shaft, pack of 5 ***£1.00***
821 Reducers 3mm to 2mm enables gears, pulleys and wheels, to be fitted to motor shaft, per 5 ***25p***
867 Reducers, 4mm to 2mm, as above, per 5 ***25p***
868 Reducers, 4mm to 3mm, as above, per 5 ***25p***

710 Sonic switch. Clap your hands, the motor starts, clap again the motor reverses, on the third clap the motor stops. Needs 4 AA cells, not included. ***85p***
723 Microswitch miniature, lever operated ***40p***
822 Plastic toggle switch, low voltage ***40p***
688 Crocodile clips, red, miniature, insulated. ***5p***
759 As above but black. ***5p***
788 Crocodile leads, assorted colours, insulated croc. clips at ends, 36 cm long, pack of 10 ***£1.35***

835 2 x AA Cell ('battery') holder **15p**
845 2 x C Cell ('battery') holder **20p**

789 MES (miniature Edison screw) bulbs 3.5 V. ***9p***
691 MES battenholders for above. ***20p***
866 New! Lens end lamps, 1.2 V MES. Ideal for use where a narrow concentrated beam of light is needed. Bargain pack of 100 **£3.50**
508 LED (light emitting diode) 3 mm, red, per 10. ***50p***
761 LED 3 mm, yellow, per 10. ***60p***
762 LED 3 mm green, per 10. ***60p***

790 3V buzzer. ***55p***
846 Sound module with 'melody' chip ***£1.00***
838 Solar cell, 100 x 60 mm, 3.75 V per cell, max. ***£2.10***
839 Solar motor, body 25 dia.12 mm long with shaft 2 mm dia 6 mm long. ***£1.70***
840 Solar pack : one of each solar cell, solar motor, propeller (801), and 3 V buzzer - with notes. ***£3.75***
836 Motor mounts, plastic, push-fit with self adhesive base pad for SSERC motors 593 & 614,10pk ***£1.95p***

801 Propeller, 3 blade, to fit 2 mm shaft. Blade 62 mm long ***35p***
792 Propeller kit with hub and blades for ten 3 or 2 bladed propellers. ***£3.50***

794 Cotton reels (for making buggies, rubber powered tanks etc.) pack of 20. ***75p***

796 Pack of 20 pulleys, 5 of each of 10, 20, 30 and 40 mm diameters. ***£2.50***
837 Ring magnet, 40 mm o.d., 22 mm i.d. ***35p***
815 Ceramic square magnet, 19 x 19 x 5 mm ***15p***
824 Ceramic magnets, poles on face, 25x19x6mm ***35p***
823 Ceramic magnets, poles at ends, 10x6x22mm ***12p***
825 Forehead temperature strips, liquid-crystal type, *temporarily out of stock.*
833 Floppy disks, $5^1/_4$" double density, box of ten **60p**
834 As above but double sided high density, ten **60p**

Cash with order only when total value is less than £5 and please add £1 for carriage solely to these small orders (except where an inclusive price is indicated eg kits, etc). For orders totalling more than £5 please do not send payment etc but await delivery and then pay on our advice note or invoice.

SSERC, St.Mary's Building, 23 Holyrood Road, Edinburgh EH8 8AE

New Website! Under construction and opening up fully this Autumn.
See http://www.sserc.org.uk and, for our new e-mail address:
contact us via - sts@sserc.org.uk

Buggy Pack £5, Paper Engineering Pack, £2 and copyright free Skeleton Template £1.25 - all still available.

See inside for information on a Solar Powered Buggy and a Clock Kit (£3.50).