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For Primary Schools and Teachers of S1/S2 courses

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Helpline: 0131 558 8180 Fax: 0131 558 8191
Email: sts@sserc.org.uk Web: www.sserc.org.uk
ISE 5-14 website: www.ise5-14.org.uk/prim3/head2.htm

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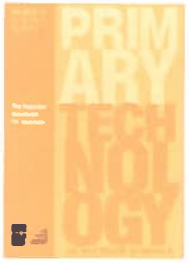
Pop-up Pals

If you use the Web regularly we're sure that you will adhere to the universally held belief that "pop-ups" are plain annoying and anything but "Pals". Google, Yahoo, AOL etc. etc. will cheerfully offer you the means to block, zap and swat them at the click o' a moose. They have become the web-page equivalent of junk advertising leaflets in your newspaper or magazine. Sometimes they merit a passing glance but most go straight in the bin. Therefore you will be pleased to hear that the following pop-ups go down well, or more to the point, up, with children and teachers alike.

The Technology component of the 5-14 National Guidelines in Environmental Studies states: "At the heart of technology education is the engagement of children with practical tasks that lead to products that serve a need, solve a problem or, in a word, work".

Those of you who have read past Science & Technology Equipment News will know our main aim is to ensure that what we suggest pupils make, works. Feedback from schools tells us that fear of the products from practical tasks not working can act as a barrier to teachers attempting technology tasks. Therefore, it is with pleasure that we summarise a report of a project, based on a Learning and Teaching Scotland (LTS) publication, *Primary Technology in Scottish Schools* [1]. Pupils at Kinross Primary School carried out the *Pop-up-Pals* section of this with much enjoyment and success. The only critical note from the school regarding the activity was that there was no hint given in the literature provided as to where the relevant resources to build the Pop-up-Pals could be obtained. This is not an unusual criticism of this type of package. At SSERC, we receive many requests for the items needed to carry out simple science/technology tasks suggested by various bodies in their publications. In this Newsletter, we build on the findings from the Kinross experience and offer a few ideas for making simple Pop-Ups and Jack-in-the-Boxes.

The Kinross experience



As part of Kinross Primary School's review of their Environmental Studies programme, *Primary Technology in Scottish Schools* from LTS was introduced. A P4 class was chosen to pilot *Pop-up Pals* from this package as an activity for the middle stages. In her report, the class teacher pointed out that, usefully, the booklet supplied for this activity came complete with lesson notes, sheets for recording findings and a net for making the pop-up pals box. As with many of these types of activities, staff at the school found it difficult to assess whether pupils would actually be able to make something that would pop up. Acquiring suitable resources proved time-consuming and difficult but the class teacher felt that this task would be easier if the activity were to be repeated.

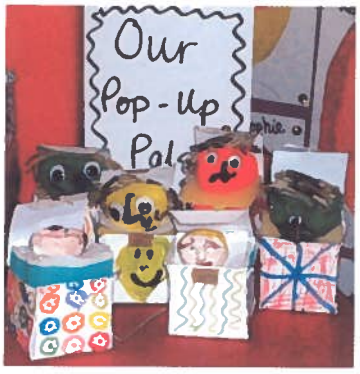


Figure 1 *- Some completed Pop-up Pals from Kinross*

It is also worth noting that more sessions than indicated in the notes were used, as the pupils had to try out different pop-up heads (Figure 1).

From the report we received, it was evident that the pupils loved the topic and had ended up with some very effective pop-up pals after experimenting with different strengths of box material, pop-up mechanisms and catches for the boxes (Figure 2). Encouragingly, they did not all end up choosing the same design or type of head. Indeed, their enthusiasm for the activity was so great that they went on to make a second pop-up based on their trial boxes, but this time with a Christmas pal inside.

Figure 2 *- Different pop-up mechanisms*

The cross-curricular links within this activity included: nets and measuring in maths; talking and listening, imaginative and functional writing in language; collaboration and working in groups in PSD and Powerpoint and borders in IT. Overall, the verdict from Kinross was that this was a very satisfactory topic for both pupils and teacher.

Paper Pop-Up design

A 'paper pop-up', is a simple alternative to the more traditional Jack-in-the-box. To make one of these requires very few resources - a craft knife, glue, card and cardboard. The steps in making it are straightforward:

Cutting - For ease of assembly discretely label the pieces of cut card or cardboard *(1-5)* as follows:-

Cut out two squares of card and one square of cardboard, each measuring 10 cm x 10 cm.

In the centre of one piece of card*(1)* and the cardboard*(2)* remove a square of 3.5 cm x 3.5 cm.

Set aside the other square of card*(3)*.

Next cut a strip of card 3 cm x 17.5 cm, mark and zig-zag fold every 2.5 cm along its length until you get a concertina bundle*(4)*.

Finally cut a strip of card 5 cm x 12 cm*(5)*

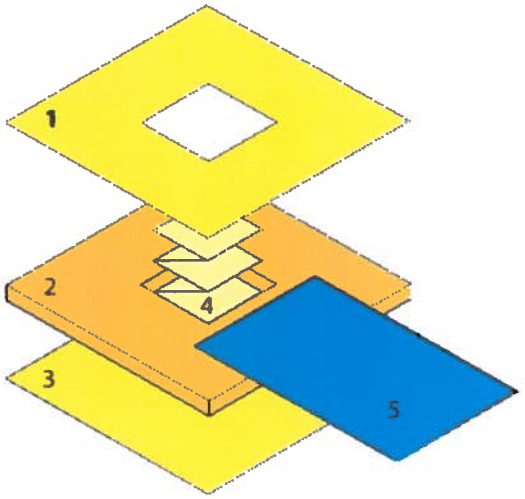


Figure 3 *- Exploded diagram of pop-up assembly with labels*

Assembly - Glue card *3* to one side of the cardboard *2* and for card *1* with the hole, carefully glue around three edges to the other side. You should now have a cardboard square sandwiched between two pieces of card with a square hole in one face *(1/2/3)*. Glue one end of concertina strip *4* to the bottom of this hole. Press the concertina strip down and slot card 5 through the unglued gap in the sandwich. Once fully inserted, this should hold the compressed concertina down. Draw a wee question mark on card *5* where it shows though the square window. At the other end which sticks out print "do not pull". You now have a working pop-up (Fig.4). Children can decorate the top of the concertina; a not-so-scary face (Fig.4) and a little frog (Fig.5).

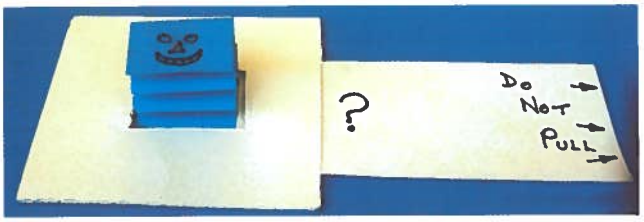


Figure 4 *- A pop-up with a 'scary face' that has popped up!*

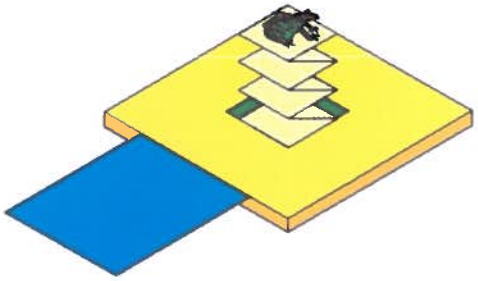


Figure 5 *- Completed pop-up with frog on top*

You need not stick to the dimensions or materials suggested here. Indeed, it would be sensible to try materials readily available in school. The weight of card we used was 160 gms. This allowed about 6 or 7 folds to be made before the concertina 'spring' fell over.

Jack-in-the-Box design

Jack-in-the-box was originally a name for a sharp or cheat, "who deceived tradesmen by substituting empty boxes for others full of money" [Robert Nares, *A Glossary of Words, Phrases, Names, and Allusions*, London, 1905].

For a more traditional type of pop-up, such as that built at Kinross, it is often difficult to muster enough resources to cover all of the ideas that the pupils will come up with. Springs are a particular problem; they must be strong enough to carry the puppet but not so strong as to demolish the box.

However, are 'real' springs needed? There are balloons, folded paper, rubber bands, plastic and numerous other things the pupils will discover that can be used instead of a spring.

A rubber band can be a very effective substitute for a spring in a Jack-in-the-box. If this type of 'spring' is chosen it is essential that a strong cardboard box is selected if collapse is to be avoided. Figure 6 shows the method of fixing a rubber band to a box using spent matchsticks or cocktail sticks.

Figure 6 *- Matchstick end fixing*

We found this method easier and more reliable than tying a knot.

What about the Jack? Ideally this should be constructed from a strong but relatively light material. When using a rubber band as a spring remember that the design of the Jack must allow it to be balanced on what is a very narrow moving strip. An effective Jack can be made from the inner cardboard core of a kitchen or toilet roll. To get one of these to balance on a rubber band, try cutting two slots on opposite sides of one end of the roll. This will help, but it can still be very frustrating trying to get the Jack to stay in place, particularly if a square box is used.

We found it easier to use cylindrical cartons rather than the more traditional square cardboard box for our Jack-in-the-boxes. It can still be a fiddly process getting the Jack in place but once in place these cylinders provide very good support for the Jack. Figure 7shows a well known cylindrical carton with an equally well known drinks-can used as a Jack.

Figure 7 *- Crisps 'n Cola can Jack-in-the-Box*

Reference – [1] *Primary Technology in Scottish Schools*, LTS Order Code P00JEX, £30, ISBN: 1859557406. Online from:- www.ltscotland.org.uk/edresources/publications.asp?id=238

"Horrible Science" magazine - a health warning

Many teachers and parents may be familiar with the "Horrible" series of books written by Nick Arnold, illustrated by Tony de Saul and published by Eaglemoss. They are now bringing out a series of magazines based on their "Horrible Science" publication. These go out as part works entitled the *Horrible Science Collection* (Fig.1). To quote the Eaglemoss website:

> *"The Horrible Science Collection takes a fun-filled, close-up look at the gory world of science. Aimed at 7-12 year olds, it comes with gadgets, gizmos and a truly toxic tin!"*

Figure 1 *- Horrible Science Collection*

Recently, we've received some complaints about the contents of one of the later issues from this series - issue number 6, *Hidden Horrors in the Home*. These centred on this issue in general and about one article, in their 'Loony Lab' section, in particular. This is entitled *Grow your own manky microbes*. One of our complainants, a biology teacher and parent, described it as "irresponsible in the extreme".

A plastic petri dish and sachet of agar powder are provided as a 'free gifts' with this issue and young children are encouraged to sample areas which, unfortunately, are likely to harbour disease-causing organisms (pathogens). Such sites include a toilet handle, their mouths and the dog's ear. As a possible extension it's even suggested that they sample their noses as sources of 'bogeys'. This last type of site is very likely to have pathogenic organisms such as *Staphylococcus aureus*. Put *methicillin resistant* in front of this name and you have antibiotic-resistant strains of this particular organism - MRSA. This 'superbug' can live in most healthy people without making them ill but if a patient in hospital with deep wounds and/or a low immune system contracts it, it can be life-theatening.

Suggestions are given on how to prepare growth media and culture micro-organisms using kitchen equipment. The methods described both for 'sterilising' equipment for preparation or disposal are inadequate (and that's being charitable). Nothing is said about keeping the dish of culture medium closed, once the samples have been added to the agar. In schools we do this routinely to stop potentially harmful organisms getting out. It's called containment i.e a major way to control any risks of infection.

To quote our biology teacher parent again: "The potential for real harm is jaw-dropping. Even in school, under supervision of trained staff, we would not be allowed to do much of what the article suggests, namely for health and safety reasons. How can they be sure that every child will follow even the meagre and woefully inadequate safety advice given?" The honest answer is they can't.

We might well agree that many teachers and society at large have become far too risk-averse. We might usually also welcome developments and publications which seek to re-inject the fun into science. In our considered view, however, "Grow your own manky microbes" is a step too far in such a process and as such represents the unacceptable face of publishing to popularise science.

We are given to understand that complaints about this issue of Horrible Science may already have been formally raised with Trading Standards Officers. We await the outcome with interest. Meantime, primary teachers with a healthy interest in this area (and it is a fascinating topic) are referred to Section 14 of "Be safe!" [1]. Secondary teachers of science at S1/S2 should consider both that reference and the revised edition of the Code of Practice on Safety in Microbiology which may be downloaded from the members' section of the SSERC website [2]. Finally, as part the Improving Science Education 5-14 initiative SAPS and SSERC have been developing and trialling materials for microbiology and biotechnology at Levels E and F. Those we hope to publish this Autumn.

1. Be safe! ASE, 2001 third edition, ISBN 0 86357 324 X
2. http://www.sserc.org.uk/members/Safety Messages/safety_messaMicrobiologyCoP.htm

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Jack In the Box
Jack In the Box
Curl Up small
(Children curl up small on the floor)
Jack In the Box
Jack In the Box
JUMP UP TALL
(Children pop up as high as they can)

Jack in the Box
Jack in the Box
(Tuck thumb inside fist)
Jack in the box
Sitting so still
Won't you come out?
(Shake finger at fist)
YES I WILL!
(Pop thumb up)

Components & Materials

Item	Description	Price
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 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
811	Worm and gear, 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	50p
818	As above but 95 mm long, pack of 4	50p
819	As above but 12 mm long, pack of 4	50p
800	Pack of 100 wheels, 39 mm diameter, assorted colours, 3 mm axle hole	£5.25
820	Worms to fit 2 mm electric motor shaft, pack of 5	£1.00
821	Reducers 3 mm to 2 mm enables gears, pulleys and wheels, to be fitted to motor shaft, per 5	25p
867	Reducers, 4 mm to 2 mm, as above, per 5	25p
868	Reducers, 4 mm to 3 mm, as above, per 5	25p
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
729	Battery connector, PP3 type, snap-on press-stud, suitable for Items 835 and 845	5p
789	MES (miniature Edison screw) bulbs 3.5 V	10p
691	MES battenholders for above	20p

Item	Description	Price
866	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 (works with solar cell see Item 838)	55p
846	Sound module with 'melody' chip	£1.00
838	Solar cell, 100 x 60 mm, max 3.75 V per cell	£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	£2.35
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	£1.25
796	Pack of 20 pulleys, 5 of each of 10, 20, 30 and 40 mm diameters.	£3.50
802	Pack of 10 pulleys, 12 mm diameter.	£1.50
837	Ring magnet, 40 mm o.d., 22 mm i.d.	35p
815	Ceramic square magnet, 19 x 19 x 5 mm	15p
823	Ceramic magnets, poles at ends, 10 x 6 x 22 mm	12p
861	Bimetallic strip, 10 cm length	30p
882	Quartz clock movement , dimensions 56x53x17 mm, with wall hanging bracket, Suitable for dial thickness up to 10 mm. Includes plastic hands suitable for dial diameter to 200 mm. Requires an AA battery. See CD Clocks, Newsletter 18	£1.75
884	Onager kit. Wood cut to length etc.	£2.00
885	Chariot kit. Templates and parts	£2.00

A fully illustrated version of this list is posted on the ***Shop*** section of the SSERC website:
http://www.sserc.org.uk/members/Primary/Surplus/body.htm

This Newsletter and previous issues can also to be found in web page format on the Improving Science Education 5-14 website at:
http://www.ise5-14.org.uk/prim3/New_Guidelines/Newsletters/menu.htm

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SSERC, St Mary's Building, 23 Holyrood Road, Edinburgh, EH8 8AE Tel: 0131 558 8180 Fax: 0131 558 8191
Email: sts@sserc.org.uk Web: www.sserc.org.uk