

# Primary Science & Technology *Bulletin*



Ideas and inspiration for teachers in Primary Schools and S1/S2

- > 50 years of SSERC
- > Paper making for beginners
- > Primary Science Teaching Trust
- > Making a science book



# 50 years of SSERC

**Whilst I can claim to be one of the longest serving members of the current SSERC team and whilst it may look as though my memory stretches back to the beginning of SSERC it really doesn't. So in putting this article together I have to thank John Richardson, Director of SSERC and my predecessor, for the excellent articles he wrote for both our 21<sup>st</sup> and 40<sup>th</sup> birthday editions much of which I have - in John's words - recycled here.**

John became Director in the early 1980s and held the post for over 20 years. We all owe him a great deal for the way he managed to lead the organisation through some difficult times.

Although SSERC, or more correctly SSSERC (the Scottish Schools Science Equipment Research Centre), came into being in 1965, the origin of the Centre was a technical sub-committee of the Advisory Committee on Physics set up in 1961 to advise the Secretary of State on all matters relating to the teaching of physics.

There were problems recruiting and retaining science teachers, we had outdated syllabuses, old-fashioned suffocating exams.

This pre SSSERC sub-committee chiefly assessed apparatus for its suitability in use with the modernised 'alternative' physics syllabus. They also designed prototype kit to plug the gaps where no suitable apparatus existed. This work was done by teachers in their spare time, with the help of the late Professor W.H.J. Childs. They worked in their own schools and at what is now Heriot Watt University. Incidentally, the new, but alternative, physics syllabus took only a few months to write and agree on.

By then, in England and Wales, the original Nuffield Foundation Science Project had begun. Scotland was designated a "Region" and a team was set up under the leadership of W.R. Ritchie. More development work on equipment began in schools and in the Apprentices' School at Ferranti Ltd. Figures such as "Physics is Fun", Jim Jardine, the late John Emery of Glenalmond and




*Figure 1 - The 1<sup>st</sup> issue of the Bulletin.*

the late Joe Stewart all worked with Bill Ritchie. They produced ground-breaking bits of teaching kit such as the linear air track, the Venner stopclock and magnetic pucks for frictionless motion. By the Summer of 1963, several members of this group were also heavily involved with the work of the Scottish Nuffield physics team.

New biology and chemistry syllabuses were set to join the alternative syllabus already developed for physics. With the backing of the Scottish Education





Department, and the National Advisory Committee on Physics, the local authorities were asked to co-operate in the setting up of a national science centre. Within 18 months, a structure for the funding and governance of such a Centre had been agreed, premises identified and refurbished.

The original organisation from 1965, SSSERC was a partnership, one led jointly from the outset by Edinburgh and Glasgow, "Corporations". They, in turn, recruited one or two others from the City and County Councils (at that time they were the education authorities). These core partners laid the legal and administrative foundations for what was to be a national advisory centre. Only when the initial stages were complete and premises found, was membership of the scheme offered to all of the Scottish City and County Councils as education authorities. In the present, councils are continually being urged to consider setting up shared services in the drive for efficiency. In this respect, SSERC was decades ahead of its time!

From the outset, and for a long time afterwards, the Centre's team remained small (5 to 7 staff). Many of the ideas for development and testing programmes were still coming from teachers and technicians based in schools. Even now, 50 years on and with the staff team swollen by secondees, semi-retirees working part-time and other folk on short-term contracts, we remain no more than a small to medium sized enterprise - although not in output.

With the advent of the Health and Safety at Work Act in the seventies, SSERC undertook the task of interpreting the multitude of documents, designed to cover workplaces as diverse as single person enterprises through to massive corporations, and identifying which part of the legislation was relevant to schools. Ensuring that employers are able to meet their legal obligations with regard to health and safety in science and technology classes will always remain a vital component of our work.

SSERC in 2015 has a profile that has expanded radically from the early days. One area in which this change is most noticeable is in our role in supporting teachers and technicians through our involvement in the delivery of professional development programmes. With significant support from, amongst others, the Scottish Government, the National Science Learning Centre, the Wellcome Trust and the Primary Science Teaching Trust, we have over the past 10 years worked with staff from virtually every secondary school in Scotland. Our support for science and technology in the Primary sector continues to grow; through our Primary Cluster programme we will, by March 2018, have worked with all Local Authorities in Scotland to put in place experiential professional development opportunities for their primary practitioners. Alongside our professional development work we produce new resources to support school educators in Scotland with

the implementation of *CfE* and new qualifications. We strive to ensure that science and technology teaching in Scotland remains firmly practical and experiential.

It is a real achievement for any organisation to reach 50. I believe SSERC has managed this by always ensuring that its core members (the 32 Scottish Local Authorities, teachers and technicians) receive a service that meets their needs - thanks to staff who are both passionate and completely committed. On top of this, we've also had wonderful support in the governance of the Centre. In the 50-year lifetime of SSERC, we've only ever had six folk in the chair [The late Prof W.H.J. Childs and Councillor Joe McGinley; Councillor Ross Martin, Councillor David McGrouther, Councillor Kay Morrison and Councillor Walter McAdam] (sequentially not simultaneously). Councillor David McGrouther deserves special thanks for his unstinting efforts over many years, firstly as chair of the governors and then as chairman of the SSERC Board since incorporation.

***Diamond Jubilee next!***

*Fred Young,  
Chief Executive, SSERC*

# Paper making

In this digital age the switch to the paperless office may only be a question of time - however spare a thought for the humble piece of paper and its rich history. We take paper for granted but exploring the area of papermaking in greater depth could lead to the delivery of Experiences and Outcomes in a number of curricular areas: the sciences and technology as well as literacy and social studies [1].



Throughout history paper has been used for many purposes, by many cultures - beyond the obvious recording of texts (both religious and secular) it has also been used to produce maps, banknotes and artistic masterpieces as well as more mundane uses such as humble packaging - packaging which is all too often discarded without a second thought. Paper is still important in our everyday lives and is often at the forefront of our efforts to reduce, reuse and recycle. The development of paper products over time could provide a stimulating area for practical activities and research [2].

## How to make paper

You will need a source of shredded waste paper (we used paper from the office shredder) - different types of waste paper e.g. newspaper or tissue paper can be used to produce different textures.



Figure 1 - Deckle and mould.

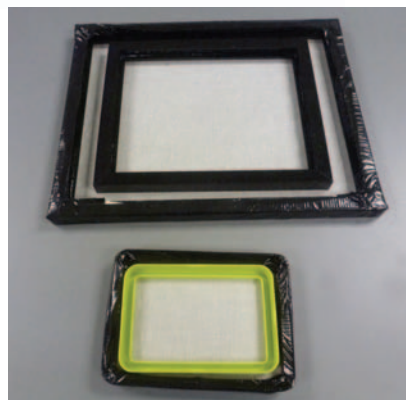


Figure 2 - Frames used to make a deckle and mould.

One of the most important pieces of equipment is the deckle and mould - (Figure 1) we made our mould (the larger of the frames) using 1 cm x 1 cm timber, nailed together at the corners, with muslin or net stretched and stapled to the outside edges.

The smaller inner frame is called the deckle and does not have any muslin stretched over it. The job of the mould is to act as a strainer - retaining the paper pulp and allowing water to drain through. The deckle keeps the pulp in place and governs the shape and size of the finished sheet. A deckle and mould can be made from two cheaply purchased picture frames (Figure 2).



Figure 3 - Equipment for paper making.

We used waterproof tape to secure the muslin to the mould. A piece of thick cardboard which fits inside the deckle is also needed along with a waterproof plastic tray (Figure 3) Ensure that the deckle and mould can fit into the tray easily.



Figure 4 - Pulp produced by a blender.



# for beginners

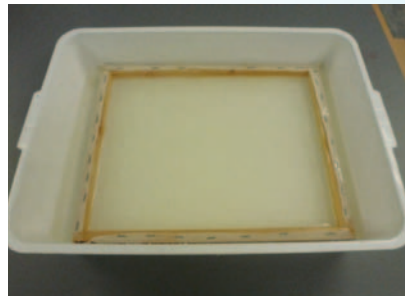
The first process is to make paper pulp from the waste paper - do this by shredding your waste paper as finely as possible. Soaking the shredded paper in warm water overnight will help to make a good pulp. We used a blender to produce the pulp shown in Figure 4. If you are going to do the same ensure that all Local Authority advice is followed with regard to the use of portable electrical equipment in school and that learners are not able gain access to the blender as there is a sharp cutting blade. At this point food colouring could be added to the pulp (Figure 5) along with glitter or flowers e.g. lavender (Figure 6).



**Figure 5** - Add food colouring to the pulp if desired.

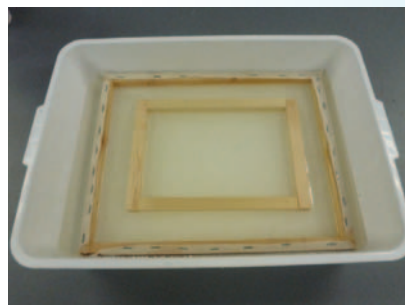


**Figure 6** - Add glitter or flowers etc to the pulp if desired.



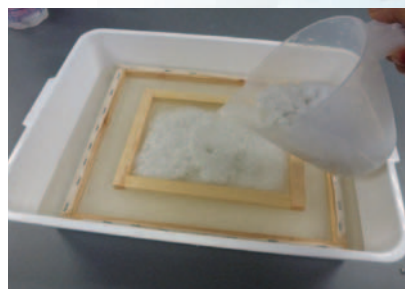
**Figure 7** - Place the mould in the plastic tray and add water.

Place your mould in the plastic tray and add water to cover the layer of muslin (Figure 7). Place the deckle on top of the mould so that it sits centrally (Figure 8). You can make the deckle larger than our example - but make sure that it fits inside the mould with a minimum of 2 cm space between the frames to allow for removal of the finished sheet.



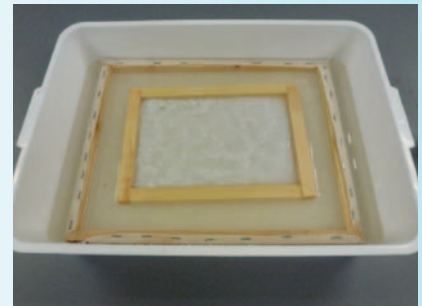
**Figure 8** - Place the deckle centrally onto the mould.

Now pour the pulp into the deckle until it just reaches the top of the wooden frame (Figure 9).



**Figure 9** - Pour the pulp into the deckle.

Use fingers to spread the pulp out evenly over the surface of the muslin below the deckle - alternatively you can hold the deckle and mould firmly together in the water and gently shake the frames to distribute the pulp evenly across the surface, keeping the pulp within the deckle (Figure 10).



**Figure 10** - Distribute pulp evenly within the deckle.

Lift the deckle and mould out of the tray and place above the tray (Figure 11) - if your mould doesn't fit then place it on a towel or layers of newspaper.



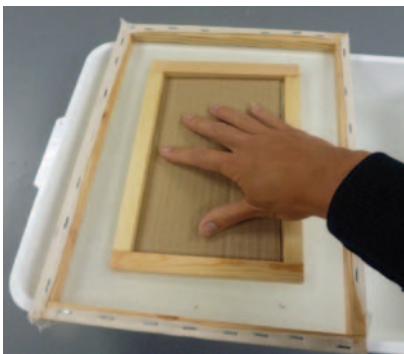
**Figure 11** - Deckle and mould atop the tray.



**Figure 12** - Embed flowers and leaves etc. in your "paper".

At this stage you can embed some flowers, leaves, seeds or glitter in the surface of the paper (Figure 12).

Now place the cardboard rectangle on top of the paper pulp within the deckle and press gently. Water will pass out through the muslin into the tray below (Figure 13).



**Figure 13** - Press gently with the cardboard to squeeze out some of the water.

Place the deckle, mould and card onto a towel or layers of newspaper and remove the deckle (Figure 14) - this can be used again.



**Figure 14** - Place on newspaper and remove the deckle.

Tip the mould over onto some newspaper and rub the muslin covering the paper, this will encourage the sheet of paper to come away from the mould in one piece (Figure 15).



**Figure 15** - Tip the mould over onto newspaper.

The cardboard rectangle is still underneath the sheet of paper so to remove this simply place another layer of newspaper on top - effectively sandwiching the sheet of paper between layers of newspaper. Flip the whole "sandwich" over and remove the top layer of newspaper - revealing the cardboard (Figure 16).



**Figure 16** - Flip over to reveal the cardboard.

Gently peel the cardboard off to reveal the embedded objects (Figure 17). Remove the cardboard and place a dry layer of newspaper over the sheet of paper and leave overnight to dry - the paper can be weighed down using suitable objects to ensure that it dries flat. ◀



**Figure 17** - Gently remove the cardboard to reveal the embedded objects.

#### Curriculum links

- Through carrying out practical activities and investigations, I can show how plants have benefited society - *SCN 2-02b*.
- Within and beyond my place of learning, I can reduce, re-use and recycle resources I use, to help care for the environment - *TCH 0-02a*.
- Within real and imaginary settings, I am developing my practical skills as I select and work with a range of materials, tools and software - *TCH 0-12a*.
- Throughout all my learning, I take appropriate action to ensure conservation of materials and resources, considering the impact of my actions on the environment - *TCH 1-02a*.
- I can investigate how an everyday product has changed over time to gain an awareness of the link between scientific and technological developments - *TCH 2-01b*.
- Having analysed how lifestyle can impact on the environment and Earth's resources, I can make suggestions about how to live in a more sustainable way - *TCH 2-02a*.
- I explore and appreciate the wonder of nature within different environments and have played a part in caring for the environment - *SOC 0-07a*.

#### References

- [1] <http://www.educationscotland.gov.uk/learningandteaching/curriculumareas/>.
- [2] <http://hqpapermaker.com/paper-history/>.



# Primary Science Teaching Trust

SSERC has had a long and positive working relationship with the Primary Science Teaching Trust [1]. Recent collaborations have resulted in the development, revision and dissemination of a number of resources aimed at encouraging and supporting classroom discussion around scientific topics - including Let's Talk Plants [2] Let's Talk Environment [3] and A Waste of Space [4].

In 2010 PSTT established the Primary Science Teacher College. This virtual College drew together past winners of the PSTT Primary Science Teacher Award; new winners automatically becoming Fellows of the College. Some teachers are also inducted as Associates. In a new development we are pleased to report that Scottish Regional meetings of the PSTT College are now taking place at SSERC.



Attendees at the first meeting of the PSTT Primary Science Teacher College in Scotland.

We are delighted to welcome 9 Fellows and 2 Associates - 5 of whom have joined the College this year. In attendance at our first meeting were Rosemary Feasey (College Mentor - North East Region), Fiona Wherlock (PSTT Business Development and Marketing Manager), Geraldine Brown (PSTT Trustee) and members of the SSERC team. Fellows travelled from as far afield as Aberdeen, Scottish Borders and Argyll and Bute to attend the meeting.

Three College Fellows - Jodie Blincow, Joanne Jarvie and Paul Tyler shared presentations on a variety of themes as diverse as a Rolls Royce Prize winning Outdoor Learning project [5], materials produced in association with the Royal Zoological Society of Scotland entitled "Beyond the Panda" [6] and Space as a context for Interdisciplinary Learning. In October three of the 2014 PSTA winners from Scotland attended the PSTT Annual College Conference in Birmingham to receive their award. Pictured are Arlene Bannerman (Knowepark Primary School, Scottish

Borders), Jodie Blincow (St Mun's Primary, Argyll and Bute) and Joanne Jarvie (Thornton Primary, Fife).

The deadline for nominations for the 2016 PSTT Primary Science Teacher Awards [7] will be July 2016 so if you know of an outstanding, innovative

and creative primary teacher (full or part-time) who engages pupils in the excitement of science and who contributes to developing science both within their own school and beyond, then please get in touch with us, at [primary@sserc.org.uk](mailto:primary@sserc.org.uk), to find out more.



From left to right: Arlene Bannerman - Knowepark Primary School, Jodie Blincow - St Mun's Primary School and Joanne Jarvie - Thornton Primary School.

## References

- [1] [www.pstt.org.uk](http://www.pstt.org.uk) (accessed July 2015).
- [2] <http://tinyurl.com/nwfjerc> (accessed July 2015).
- [3] <http://tinyurl.com/nw4x9bv> (accessed July 2015).
- [4] <http://tinyurl.com/k7hdyg4> (accessed July 2015).
- [5] <https://www.sciencelearningcentres.org.uk/about/partners/rolls-royce-science-prize/>.
- [6] <http://www.rzss.org.uk/discovery-and-learning/jlr-china-giant-panda-education-programme>.
- [7] <http://www.pstt.org.uk/science-teaching/primary-science-teacher-awards.aspx> (accessed July 2015).

# Instructions for making a science book



**Figure 1** - Materials needed to make a science book.

You will need a piece of A3 paper, card for the cover, a hole punch, an elastic hairband/piece of elastic and a twig or piece of dowelling (Figure 1).

You may wish to make a template, bearing in mind that each sheet will make two pocketed pages. Place your paper in the landscape orientation and mark on a central fold line from top to bottom. Next mark on a fold line which runs across the entire page about 10 cm from the bottom of the page. You can alter the position of this line to vary the depth of the "pocket". A template can be made and photo-copied.

Fold each sheet along the 10 cm fold line (Figure 2) and then in half. Make sure that the pockets made by the first fold are on the outside (Figure 3).

Cut a piece of card for the cover. This should be slightly wider than the book and if possible, slightly longer than the A3 paper. Fold the card in half and insert the paper pages into the cover with the folds on the outside edge (Figure 4).

Now, using a hole punch, make holes through all the layers of your book, on the side of the book where the cover is folded (Figure 5).

From the back of the book, insert the elastic hairband through the holes and then put the twig (or dowelling) through the loops of the hairband (Figure 6) thus securing the pages inside the cover.

Your book is now ready to use. ◀



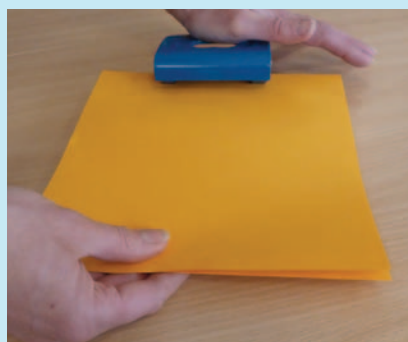
**Figure 2** - Fold along the dotted line.



**Figure 3** - Fold in half with pockets on the outside.



**Figure 4** - Ensure the folded edges of the paper are on the outside of the book.



**Figure 5** - Punch holes through all layers.



**Figure 6** - Secure pages with the hairband and dowelling.

