Primary Science & Technology Bulletin

Ideas and Inspiration for teachers in Primary Schools & S1/S2

What a waste

Tackling big issues

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What a waste

I have contributed to investigations into the role of microorganisms in producing and breaking down some materials. SCN 2-13a

Many schools are involved in composting materials but do the pupils have the opportunity to see the process in action? Using simple apparatus it is possible to work on a small scale within the classroom and view the process.

Each composter requires two plastic cups of differing sizes so that the larger one can fit into the smaller one, leaving a space below the top cup. In addition, you will need tape, something to make holes in the plastic (e.g. a fine knitting needle), cling film, a rubber band and vegetable matter which is suitable for composting. See Figure 1.

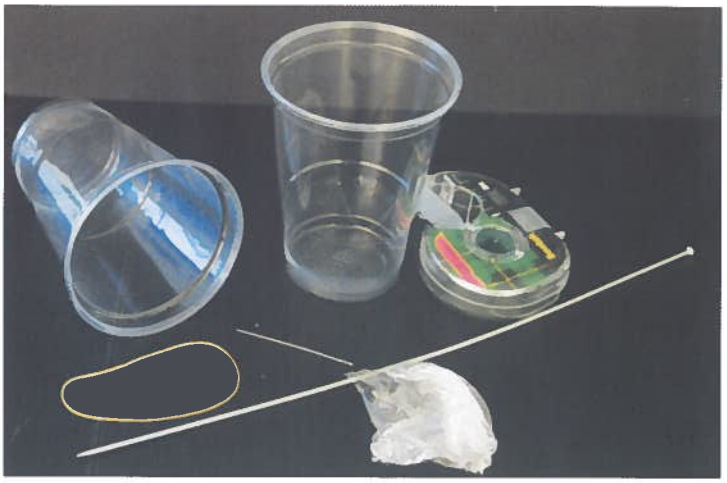

Figure 1

The cups should be prepared as shown in Figures 2 to 5.

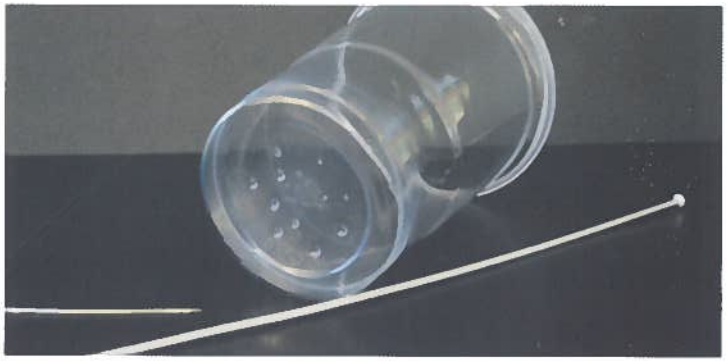

Figure 2

After a few days, liquid will start to collect in the lower cup and the vegetable matter will begin to decompose. The time taken will depend on the mix of materials used. If left for several weeks a brown sludge will be left in the bottom of the cup once the material has completely decomposed.

As well as vegetable matter pupils could use tea bags, coffee grounds and shredded paper or cardboard. What about trying biodegradable plastic bags in the mixture of materials?

Figure 3

A photographic record is one way to track what is happening. Weighing the complete composter could also be used. In our example the overall weight reduced from 203 to 197 g in 11 days.

This poses an interesting question: what has happened to cause the weight loss? What would pupils think? Would they predict this?

Microorganisms which are naturally present break down the vegetable matter to produce materials which are then used in the process of respiration. Carbon dioxide is produced during respiration and this gas is released leading to the loss of weight.

Figure 4

Figure 5

Measuring the liquid collecting in the lower cup can also be used as an indicator of the process. Using lined paper taped to the outside of the cup (see Figure 6) can provide a convenient measure of the liquid being collected.

Possible Investigations

Pupils can investigate whether changes to the composition of the starting materials affect the rate of decomposition. Does chopping up the materials make much difference? The pictures show that we have layered the materials used: what effect does mixing them before putting them in the cup have? Compare dry materials with wet materials. Advice is often given to avoid putting citrus fruit or its peel into the compost bin as it inhibits the process, is this a fact? Larger compost columns which use 2 litre plastic bottles can also be made [1] (Figure 7). To see what is available on a garden-size scale see the information on the Waste Aware Scotland website [2]

Figure 6

Health and Safety Considerations for Primary Schools

It is **very important** that air can circulate around the vegetable matter and so the cling film must be sufficiently loose so as to allow air flow.

Microorganisms are responsible for the decomposition which is occurring and, once set up is complete, the composter should not be uncovered.

Care should be exercised by anyone handling the composter and in particular any cuts or broken skin should be covered. Hands must be washed well with soap and hot water after handling the composter.

Animal matter **must not be used** in the composter.

Keep filled columns intact. Avoid spillages and set columns up so that in the event of any spillage it is contained (e.g. sit the composter in a tray). Any spillage should be cleaned and the area wiped with disinfectant.

Figure 7

The liquid residue **must not be used / handled** by pupils. It may be poured onto the material in a larger compost bin / heap. Using rubber gloves dispose of the composted material in the cup into a compost bin. The cup can be disposed of as normal household waste.

Those with respiratory or immune-deficiency problems should avoid disturbing the composters as fungal spores may be present and there is a risk of an allergic reaction.

Figure 8

References

[1] http://tinyurl.com/compost-column
[2] http://tinyurl.com/waste-aware

Tackling big issues

This is a summary of an article written by Peter Finegold [1], Isinglass Consultancy Ltd., who reported on the findings of the external evaluator of *Let's Talk* , a project funded by the Astra Zeneca Science Teaching Trust (AZSTT) and the Wellcome Trust. The evaluator was quoted as saying "this was one of the best projects which the Trust had ever funded". *Let's Talk* is based around a series of teaching and learning packs aimed at upper primary and early secondary school pupils and their teachers. It sets out to develop a scientifically literate society i.e. one in which individuals feel empowered to weigh up options and reach their own conclusions. It is the brainchild of Marjorie Smith, a teacher at Dollar Academy and curriculum development expert, currently working with SSERC.

Deaths from coronary heart disease and cancer in Scotland are amongst the highest in the UK. Reducing these figures will rely on persuading more people to change their attitudes and behaviours. Therefore educating young people about the science associated with health choices has taken on a new significance. In Scotland, the need to meet challenges about physical and mental health has placed this work at the core of the Government's major education reform 'Curriculum for Excellence'.

The teachers' packs in *Let's Talk* comprise professionally produced DVDs, guidance notes, background information, a glossary and activity materials that provide all that a teacher needs to get young people talking about science, society and ethics. A particularly popular kit is themed *Diet, Diabetes and Obesity* and has been used in 200 schools in Scotland. Typically, teachers using the packs introduce the theme to their class and encouraged to divide into small groups. Pupils then decide on the acceptability of a series of policy options from cards as shown in the column opposite.

Many science teachers feel uneasy about addressing social and ethical issues in science classes. Changes in curricula and professional development opportunities have gone some way to ensuring that science is not simply the 'delivery of factual knowledge', yet many teachers of science find it hard to shift from this more traditional role. Though *Let's Talk* stands alone as a resource, the intention is that its usage will broaden the themes, contexts and approaches for teaching and learning about science. The evaluator went on to say that it promoted better discussion activity by providing a real structure for managing meaningful debate. The increase in teacher confidence has an effect that goes beyond individual topics and packs. *"I have:*

- *tried to introduce more active learning into lessons.*
- *incorporated more debates and discussions.*
- *more confidence to try out new ideas"*

Access to reliable knowledge and a context in which young people can explore choices, is the very least that formal education should provide. The strength of *Let's Talk* goes beyond its potential to help teachers to talk to pupils and pupils talk both to their peers and to their parents, but also its position at the interface between education policy (see the recent strategy document, *Preventing Overweight and Obesity in Scotland - A Route Map Towards Healthy Weight* [2] to tackle Scotland's "obesity time bomb"), curriculum change, professional development and health awareness. The health impact of programmes like this, takes time to become visible, since attitudes and behaviours are resistant to change, and health benefits slow to surface. Yet the evidence suggests that the educational outcomes alone are more than worth the effort.

For further information on Let's Talk contact Marjorie.Smith@sserc.org.uk

References

[1] p.finegold@isingconsult.co.uk
[2] http://www.scotland.gov.uk/Resource/Doc/302783/0094795.pdf

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