Clarysly Deller outlines an approach to enquiry through a science challenge activity

Growing the seeds of scientific enquiry

As plants and seed dispersal are common themes in primary science, I thought that I would share an enquiry challenge activity that addresses many of the 'working scientifically' objectives of the National Curriculum for England. I have found this really useful in school and used it with a year 5 class (ages 9–10) in a plants topic, but last summer used it on a science challenge day with year 3 and 4 children (ages 7–9). They had a whole afternoon made up firstly of 'playing', planning and thinking time, then designing and perfecting time, and finally the joint challenge in the playground where we tested their seed carrier designs and recorded our results.

Figure 1 Interesting seed heads provide starting points for exploration

Prior learning

The children had previously looked at seeds and how they can be dispersed. They had a sound understanding of plants needing to spread their seeds widely to give the best possible chance of healthy growth and production of more seeds.

Playing with ideas

I presented the children with a range of interesting seed heads and asked them to explore their properties (Figure 1) and discuss in their 'talking science' threes how they might be dispersed. I have implemented the grouping of children in threes to discuss and explain science throughout key stage 2 (ages 7–11), in order to promote and generate good argumentation skills, enable them to explain their thinking clearly and improve their recording skills (see *Websites*).

The children then went on to model with their bodies how the different seeds may move as the wind carries them away from the parent plant (Figure 2). This helped to crystallise their thinking on methods of wind dispersal and consolidate their planning ideas for their own method.

Key words: Scientific enquiry | Plants | Seeds

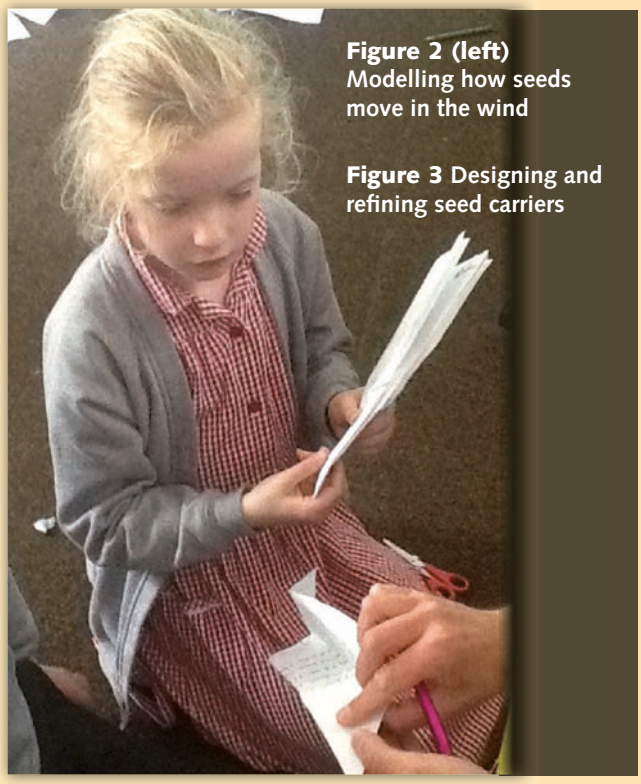

Figure 2 (left) Modelling how seeds move in the wind

Figure 3 Designing and refining seed carriers

Setting the science challenge

This was the challenge I set for the children:

I have a paperclip tree, whose seeds need to be dispersed by the wind. They need to be carried as far as possible from the parent plant, so they have sufficient light, space, water and nutrients to grow healthily and thrive. Your challenge is to design a method of wind dispersal, test and refine your carrier, then compare with the other groups to see whose method is the most effective. The paperclip seeds that are carried furthest from the parent tree will be the winners.

What the children did

Thinking and planning

The children decided which type of flight they were designing in groups of about six. The methods the class came up with in our 'playing' session were:

- **helicopter spinner (like a sycamore seed);**
- **glider plane (like a Javan cucumber);**
- **parachute drifter (like a dandelion seed);**
- **pepper pot shaker (like a poppy seed);**
- **explosion propelled (like a Himalayan balsam seed).**

We found a number of websites that were really useful at supporting these ideas (see *Websites*).

Each group would ideally use a different method, so all the different styles of flight would be generated. I have found it best to only use wind dispersal or explosive methods. I had one bright spark one year who decided to be an animal, clipped the paperclip to his jumper and ran the length of the playground before dropping it! Enterprising and great thinking outside the box, but not quite what I wanted!

Designing, testing and refining

The groups of children then went on to design a carrier, try it out, and adjust their design to improve it (Figure 3). One group decided to put their paperclips inside a balloon. When they tested this method however, by popping the balloon, all the clips just fell straight down. They then refined their idea, taping the seeds to the outside of the balloon, which was more effective in dispersing them. Another group added helicopter wings to the seeds within their balloon to give them more lift after the 'pop'. Some chose to mount their parachute-style seed on a stick for extra lift after much trial and error (Figure 4).

All the trying, testing and refining of ideas resulted in very good scientific discussion, with children explaining clearly what they did, why it was not too successful and what led to the improvements. Some of this discussion needed to be guided by asking key questions and getting children to explain why they thought it didn't work, and how they could improve it. I have found that this 'talking science' – explaining and refining ideas – equips the children to make better records later of what they have done.

Figure 4 One group's product after much trial and error

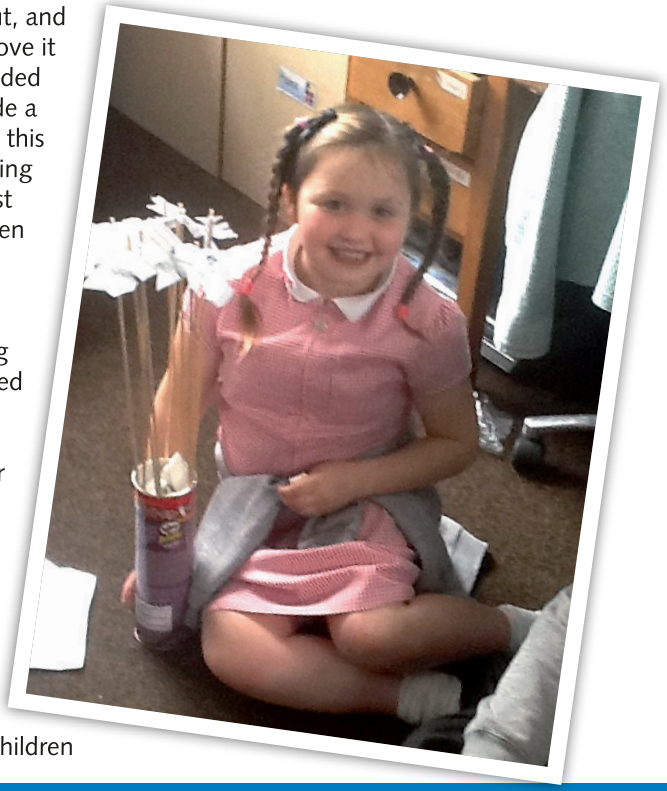

Figure 5
Testing the finished products – how far will they go?

And lift off!

Once groups were happy with their seed-carrying method, and prototypes were made, both classes went out into the playground to test them (Figure 5). A 'tree' base was set up (some PE tables) to give a high release point. Each group had 10 'seeds' to release, and the 'seed' that travelled furthest was measured from the base of the 'tree'. As two classes were involved, some used similar methods (i.e. spinner or glider), but their actual seed designs were different. The most effective seeds, based upon distance travelled from the parent plant, were the winners.

Outcomes

All the data collected on the testing day were recorded and plotted on charts and tables on a different afternoon. Children were able to articulate clearly why their method was successful or why it was not, following their initial product design and refinement, and all the groups were able to explain how they could improve their testing method or product in the future.

This kind of active enquiry, with lots of time to practise talking and explaining, leads to excellent attainment of the working scientifically objectives in the curriculum. Do have a go, and enjoy trying it!

Websites

Talking Science: **pstt.org.uk/resources/cpd-units/talking-science**

Website with good pictures of various types of seed dispersal: **www.newtonsapple.org.uk/seed-dispersal-on-the-wind**

Clip from BBC2's 'The private life of plants' on seed aviation (a good conversation stimulator): **www.bbc.co.uk/programmes/p00lxw4t**

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