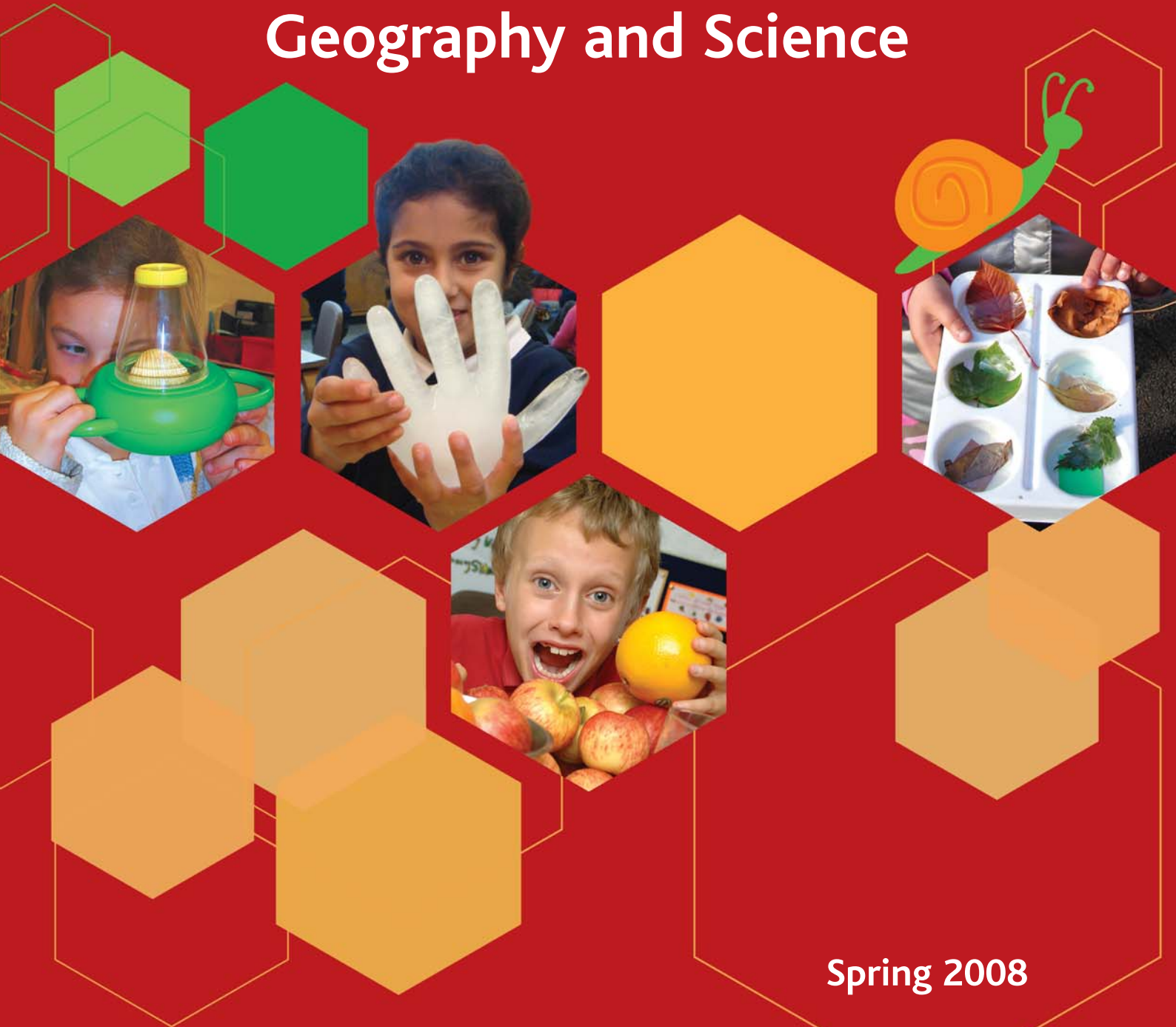




Seed Cities for Science

A COMMUNITY APPROACH FOR A SUSTAINABLE GROWTH
OF SCIENCE EDUCATION IN EUROPE

Cross-curricular Hands-on Primary Science Geography and Science



Spring 2008



Leicester is one of 12 'seed' cities in 12 European countries: UK, France, Spain, Italy, Portugal, Estonia, Hungary, Sweden, Belgium, Germany, Netherlands and Slovenia. The European Commission has provided funding to support European schools to raise standards in investigative primary science. Over the past 2 years twenty-two Leicester city schools and sixty-eight teachers have been participating in this 3 year project to:

- ◆ Promote practical investigative work
- ◆ Develop creative activities and to make better cross-curricular links
- ◆ Use the environment and facilities within the city to enhance science
- ◆ Disseminate and share good practice between colleagues in UK and other EU countries

Each year teachers are given 2 days and 3 twilight in-service sessions which are intended to support them to develop innovative practice. Over the past year sessions included:-

- ◆ Food and Science
- ◆ Investigating materials in geography and science
- ◆ The poetry of magnetism
- ◆ Strategies for relating PE and science
- ◆ Developing science ideas through D&T

This booklet gives a flavour of some follow-up activities teachers have carried out in their classrooms.

Schools in the Project 2007-2008

- Catherine Infant School
- Coleman Primary School
- Dovelands Primary School
- Forest Lodge Primary School
- Heatherbrook Primary School
- Holy Cross Catholic Primary School
- Humberstone Infant School
- King Richard III Infant & Nursery School
- Linden Primary School
- Mayflower Primary School
- Mellor Community Primary School
- Northfield House Primary School
- Rolleston Primary School
- Rushey Mead Primary School
- Sacred Heart Catholic Primary School
- St John the Baptist C E Primary School
- St Joseph's Catholic Primary School
- St Thomas More Catholic Primary School
- Sandfield Close Primary School
- Scraftoft Valley Primary School
- Shenton Primary School
- Wolsey House Primary School

Contents

Introduction	2
Food and Science Challenge Summer 2007	4
Geography and Science Autumn 2007	7
Examining the Environment	8
Water and the Water Cycle	10
Investigating Weather	13
Vision and Light	14

'Great hands-on activities. Practical ideas that really work!'

'The Pollen project has been an exciting, interactive and inspiring project allowing us to network, ask questions and learn from each other.'

Teachers' comments



The Pollen schools were challenged to carry out a science project about food during June and July. They were asked to carry out investigations which involved people or businesses from the wider Leicester City Community in some way. Six schools took up the challenge. Pupils aged from 5 to 11 were involved. Links were made with local businesses by Leicestershire SETpoint who also provided a science workshop for the best Key Stage 1 and best Key Stage 2 class. Each participating school was visited by at least two visitors who found the standard of work extremely high.

◆ **Key Stage 1 winners – Humberstone Infant School**

◆ **Key Stage 2 winners – Heatherbrook Primary School**



Investigating composting Wolsey House Primary School

◆ Key Stage 1

The pupils noticed that the compost bin was full and not rotting down enough so they wrote to a local gardener to ask what was the best way to make compost. He replied that they needed to add other materials to the bin. Consequently, the pupils tried adding different materials (soil, grass, paper and nothing) to some discarded fruit in 4 zip-up bags. The pupils stored the bags in a cupboard and looked at them over 3 weeks to see what happened, taking photographs at different times. They found the fruit rotted fastest with the grass added to it. The gardener then came into school to talk to the children about their findings. He also brought in a wormery to show the children how worms help with the composting process.

Investigating Smoothies Heatherbrook Primary School

◆ Year 4

The Year 4 class did a project on smoothies working with Asda, who provided different types of smoothies and lots of fruit. The pupils received a 'letter' from Asda asking the children to invent a new smoothie. The pupils first looked at some existing products and packaging. They then did an experiment to see which would be the best packaging to keep the smoothie cool. They made their own smoothies using different fruit. They found that the most popular ones were without seeds. Consequently, they worked out the best way to separate the seeds using different sieves. Each group of four pupils finally invented a name for their smoothie, a logo and slogan, designed some posters and cartoon characters to advertise the smoothies and made up an advertising jingle.



Healthy Eating: Coleman Primary School

Year 2 & Year 6

A dietician visited the Year 2 children to talk about the 5 food groups. The pupils wrote a big book based on Little Red Riding Hood, where Grandma had written to them complaining about the unhealthy food Red Riding Hood kept bringing her and asking them to advise her granddaughter on a healthy diet. The end of the book showed Red Riding Hood's basket full of healthy food with an explanation why Granny needed vitamins and proteins to help her get better.

The Year 6 class also looked at what constitutes a healthy diet and analysed their lunch boxes. They discovered that they usually had very unhealthy lunches with only 2 pupils having any fruit, and they all had crisps. This prompted them to investigate how much salt there was in healthy and unhealthy crisps. They were amazed that they couldn't see the salt because it was so covered in saturated fats. Most said they were 'off eating' so many crisps and would try to have more fruit. A group of 6 children then created an animation about a healthy lunchbox.

As vegetables are an important part of a healthy diet, two large garden beds were created to allow the Year 2 pupils to grow vegetables as part of a gardening club. Children had to write an application to join the club – outlining the attributes they had which would make them eligible. They were responsible for taking care of the garden: weeding, watering and adding compost. They established compost bins and a school system whereby they collected fruit – cores, peel etc. – each lunchtime to be added to the compost.

Dr Matthews from De Montfort University also visited the school to talk about science in the supermarket. She demonstrated a number of experiments for the younger pupils, using food such as red cabbage. She also gave a talk to the Year 6 pupils about the science of chocolate.

Science of Sport

The topic for the June & July 2008 Challenge is the Science of Sport. Leicester City and Leicestershire schools are invited to participate.

Details from Ann Brant
Tel: 0116 2523659 Email iab6@le.ac.uk
or Judith Payne Leicestershire SETpoint
Tel: 0116 2407000
Email Judith.Payne@leics-ebc.org.uk



In-service Provision

The teachers in the Pollen Project tried out and developed activities following a day's in-service in October 2007. Each teacher took 2 of 4 possible workshops given by Rosemary Feasey and Tina Jarvis. The workshops focused on:-

Examining the environment

Teachers were taken out into the local area to look at local trees and the invertebrates that live on them. They also considered how to create a forest role-play area; produce environmental stories based on photographs of the locality; as well as how to make judgements about information on endangered species.



Water and the water cycle

This session showed how the processes of the water cycle occurs in many locations such as the school grounds and in bathrooms, not just at the seaside. The session also covered the use of role-play to help the understanding of change of state, evaporation, cloud formation and rain.



Investigating weather

As part of this session teachers considered traditional and modern ways of forecasting weather; measuring temperature; how to make a simple thermometer; and doing investigations using solar panels.

Vision and light

This session considered the properties of light, the eye and ways to enhance sight. Activities included considering the structure of the eye, care of eyes, use of glasses as well as exploring the properties of light. Teachers examined microscopes, lenses, binoculars and telescopes as ways of enhancing sight, and made simple periscopes, telescopes and kaleidoscopes.

During November each teacher tried out and developed at least one of the ideas introduced during the in-service with their classes. Each class was visited by Karen Stuart or June Agar who provided an audience for the children to show their science work. The information in this booklet reports on the activities seen on these visits.





Examining the Environment

Growing conditions of fruit and vegetables around the world

Year 1/2

In the context of studying celebrations, one Year 1/2 class looked at special foods. This led into examining fruit and vegetables. Having discussed and charted their favourites using ICT, the pupils looked at a large world map which showed some fruits and where they came from. The teacher used this experience to talk to the pupils about how temperature affects growth.



Exploring nature around the school

Years 1, 2, 4, 5 and 5/6

Several classes used the environment around the school for science activities. A Year 1 class was given a palette of different paint colours and asked to match these as closely as possible with a naturally occurring colour outside in the school grounds. The activity resulted in a great deal of discussion and comparisons of the finds amongst the pupils.

Another Year 1/2 class was shown an email from the local EMAS (Eco-Management & Audit Scheme) which asked the children if they could help to find out what wildlife lives in Leicester City schools. They were challenged to find, collect and discuss ten objects. Finally, the children wrote poems entitled 'The Tree' based on what they imagined a tree might see, hear and feel.



Close investigation of wood

A similar activity was carried out by a 5/6 class as part of revision about plant life. They also collected and discussed ten objects. These pupils were additionally given a magnifying lens and a metre-length of string to circle an area on the ground as a focal point for close study. Another Year 5 class also used hand-held microscopes and magnifiers to look at logs and branches. A Year 4 class visited a nearby allotment to look at woody stems, tendrils and trunks, as well as to think about ways of supporting plants that cannot stand alone.



Palette of colours

From satellite image to reality on the ground

Year 1/2

A Year 1/2 teacher used a series of satellite images of the school's grounds to focus in progressively on the area the class was to explore. Armed with maps, cameras, clipboards, magnifying glasses and torches, the pupils set about collecting and recording in detail what they found. The maps, each covering a separate zone, were then annotated with a drawing and a key feature for that section of the grounds.

Examining and planting trees

Year 3

By looking at their school through Google Earth, the children could see that, even though it is a city school, it is surrounded by trees and bushes. They discussed a variety of tree facts. They were then told that they were going to make an impact on the environment themselves - by planting a cherry tree. Once they had done this, they collected some objects in the vicinity of the sapling for a picture which was created in the classroom. A class discussion raised the issue of the degradable and non-degradable rubbish they had found and its possible impact on the environment.

Scaring birds from crops

Year 5

This Year 5 class had already been to the allotment near the school, where they had seen and discussed with allotment holders ideas for scaring birds away from the crops, including reflective discs etc. It was decided that an effective audible scaring system, in the form of wind chimes, was needed to complement the visual systems. The task for the class was to plan and investigate which materials would produce the loudness and pitch needed.

Imaginary ecosystems

Year 4/6

Pupils were assigned to groups with the task of imagining and drawing the environment on one of four islands to work out how they would survive on it. The islands were hot/dry, hot/wet, cold/dry, and cold/wet. After extensive discussion it was decided that water would probably be found in cacti on the hot/dry island. The pupils agreed that if there were no trees, rocks might provide shelter from the sun. White clothing was decided upon, since it would reflect the sun's heat. The cold/wet island group took some time to dispel the ingrained media images of all islands as being exclusively tropical before deciding on a shelter built of hay, straw or sticks.



Prototype bird scarer



Water and the Water Cycle

Investigating rates of melting ice

Year 6

To give a context for the investigation, pupils were told the story of the sinking of the Titanic. They looked at a picture of an iceberg and discussed what icebergs are and where they are found. Would icebergs remain longer in salty sea or fresh water? The pupils then planned and carried out an investigation to find out if ice cubes would melt at different rates in air, fresh water and salt water. Another Year 6 class explored why we put salt on icy roads. Pupils took two containers of crushed ice and measured the temperature of each. They sprinkled salt into one batch of ice and observed, in astonishment, as its temperature went down to -10°C .

Examining ice hands

Year 1

Several classes explored ice hands in an open-ended way. They examined what would happen to them if they were left in the air or put in water. Some children tried putting salt on them and others tried dripping food colouring on them and dusting them with talc.



A complete ice hand

Food colouring dripped on an ice hand



Protecting the ice giants' icy treasure

Year 1

This Year 1 investigation was based on the story of the Ice Giants. The children were told that their treasure had been stolen, but when the robbers got back home it had melted. The children were sent a letter asking if they could find out where the treasure would be safest. Three treasure boxes were used. The 'ice treasure' was placed in them and three different locations were tested to find the best.



Ice treasure

Helping Santa by gritting icy roads

Year 2

A Year 2 class was presented with the problem that Father Christmas needed another way to deliver presents because Rudolph was ill. After some partner talk, the class decided he should use a car, but that the roads would be very icy. Someone suggested that the use of a gritter lorry would melt the ice. But what to put in the gritter? The choices discussed were salt, sugar and food colouring. Food colouring was popular at this stage because it was liquid and that was what they wanted to turn the ice into. Each group was given a tray with three pieces of ice to which they added the agreed amount of one teaspoonful of salt, sugar or food colouring. Finally they decided to tell Father Christmas that he would need to use salt in the gritter lorry.



Testing de-icing options

Factors that influence the rate ice melts and its importance as an indicator of global warming

Year 4

The teacher of this Year 4 class provided a whole-class activity alongside their personal investigations. She set up two miniature 'icebergs'. One was sprinkled with salt. Both had probes linked to the interactive whiteboard and the temperature monitored while the pupils did their own investigation on how to melt ice. While they had a control ice cube at room temperature, groups of pupils placed other ice cubes in a variety of different conditions that they had devised. These included darkened rooms, foil wrappings, warm radiators etc. Every five minutes, the pupils used thermometers to check the temperature of their ice or water and compared it to the control, recording their results on a chart or graph. The results were finally reported back to the whole class and conclusions made about heat being needed to melt ice. The class then looked at the conditions of the "icebergs" and drew preliminary conclusions about the different rates of melting. Finally, they viewed a video clip of the accelerated melting of real polar ice and discussed the implications for wildlife.



Icebergs with probes



Keeping ice cream frozen

Year 2

A different context for thinking about melting, solids and liquids was used by a Year 2 teacher. She first showed the class a video-clip of a Yeti. The pupils were then given an imaginary letter from him, saying that he wanted to visit England, but was worried that his ice cream (his staple diet) would melt. The class was challenged to find the best place to keep things frozen. Plates of ice were placed in three different locations to test their ideas.



Filtering water



Soaking up oil

Cleaning water

Years 4/5 and 6

Before starting their investigations, the water cycle, associated scientific language and key facts were thoroughly revised by a Year 6 class. The movement of water molecules in three states (ice, liquid and steam) were also acted out by the pupils. They then went on to consider environmental issues such as the lack of clean water in some countries and oil spills. To investigate how best to clean a bucket of dirty water, the pupils used fizzy drink bottles as filter holders with combinations of filter and kitchen paper. They also tried out a number of ideas for soaking up oil in a bowl of water – an oil spill. These included soaking up the oil with kitchen paper, sprinkling flour on it and adding detergent. The pupils observed that none of the methods were particularly successful, and the flour and detergent actually polluted the water more. A Year 4/5 class carrying out a similar investigation on filtration found that the water did not run clear on the first filtration and so repeated the process on their own initiative and found that the clarity steadily improved.



Using and making thermometers

◆ Years 3, 4 and 5

Several classes examined thermometers. After talking about how temperature can affect the liquid in a thermometer, one teacher showed the pupils how to make a simple version. The pupils were then challenged to make and test their own. Once the minor problems of sealing the thermometer tubes and having sufficiently hot water were solved, the rising and falling liquid in the finished thermometers provided some “wow” moments for the groups of pupils. The plenary was then used to create a list of uses of thermometers, such as weather prediction and monitoring temperatures for safe cold storage of food.

Observing convection

◆ Year 5

A Year 5 class worked in small groups to observe convection in liquids. They needed great care to set up coloured warm water in a transparent plastic container directly underneath a similar container of cold, clear water with the open ends touching. Once the plastic card placed between the bottles was removed the coloured water rose quickly into the clear water. The activity was repeated with a more restricted opening between the two containers, slowing down the mixing of the fluids and allowing the pupils to observe more closely the coloured water rise and swirl as it did so. The plenary related the rising hot water to a hot-air balloon where heated air is used to keep a large object airborne.





Reflective and shiny materials

Foundation 2 and Year 1/2

Children in Foundation 2 linked a previous topic on light and dark with a new theme focused on the colour gold. They had a dark cave area and a water tray where gold-coloured objects and baubles could be looked at using different light sources. They also shone torches through combs to investigate the straight lines the light made, which they then traced with glitter. Alongside the investigation, pupils made picture frames with different reflective and shiny materials.

A Year 1/2 class explored the use of light in the context of traditional celebrations such as Diwali, Bonfire Night and Christmas. After this they were introduced to the idea of reflected light and its uses in road safety. The starting point for the activity was the traditional Cinderella story. The pupils were asked to create a reflective ball gown that would keep her safe when she ran off into the night at the end of her evening. The materials were tested for their reflective quality before they were applied to the ball gown and then tested again, using a torch in a darkened room.



Tracing light rays

Examining methods of enhancing and improving sight

Year 1

A Year 1 class explored a wide variety of optical devices to correct sight defects; to protect the eyes; to assist the eye to view fine detail; or for entertainment. Pupils were also able to use spinning coloured discs to observe how the full spectrum makes up white light.

Investigating the properties of light

Year 6

A Year 6 class completed a carousel of activities which included: looking at optical illusions on the internet; investigating a light box; looking at straight lines made by the light of a torch, and using a comb and pasta to mark the path of light. They also explored fly's-eye lenses, kaleidoscopes and periscopes. The children were enthused by all the activities, which provoked a lot of discussion about the topic of light.

Choosing a torch

Key Stage 1

This investigation used a story about Percy the Park Keeper as a stimulus for various activities that took place in the role-play area. This area contained real leaves and natural objects in the water tray. The pupils were asked to help Percy to choose a replacement torch for the one he had lost. They discussed the brightness and reach of the beam as well as different materials, sizes, shapes and resistance to water. They also thought about the need to limit the brightness of the torch, so as not to wake sleeping animals at night.

Instructions for lighting a bulb

Year 1/2

With the equipment for making a circuit on the tables in front of the children, the teacher told the children that their teaching assistant had the instructions for them to follow for lighting a bulb. This was denied by the teaching assistant, and after a mock argument it emerged that there were no instructions. When the teacher asked the children if they thought they could light the bulb and write a new set of instructions for her, they readily agreed. The children completed the task and each group in turn showed the rest of the class how they did it.

Investigating material for windows

Year 2

This science investigation, linked to history, was initiated by an imaginary letter from Christopher Wren, asking for help with finding the best materials for the windows in the new houses he was designing. The pupils were required to assign jobs to each person in the group, e.g. Chief Investigator, Chief Light Monitor etc. The pupils took these roles very seriously. They were required to predict before investigating the different materials. Once the groups had made a decision as to which material was the best for the windows, the class shared their results to make sure they all had come to the same conclusion.

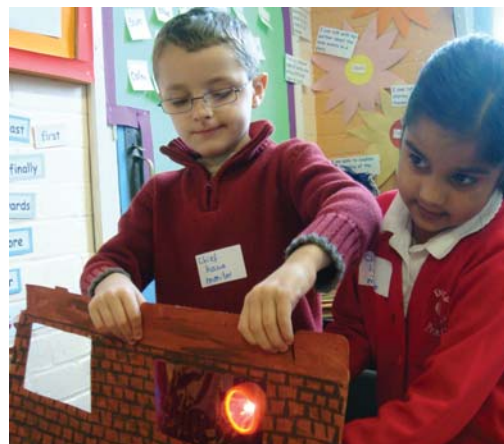
Shadow puppets

Year 6

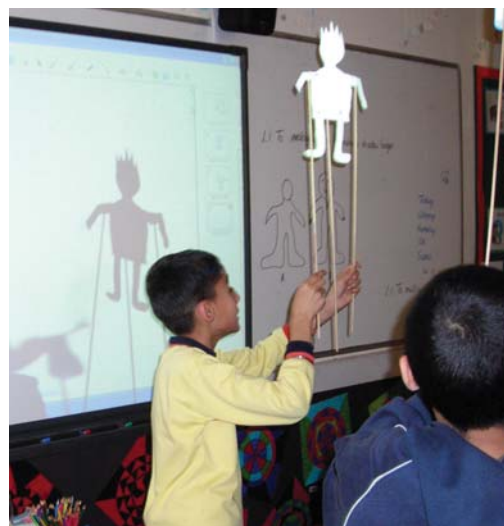
Two Year 6 classes used shadow puppets to revise ideas about light and shadows. One class planned how to systematically change variables and to take measurements. Another made puppets a for a story about an imaginary round-the-world journey. Although each puppet was the same size, the shadows had to be true to the real-life relative size of animals and objects. This meant that the pupils had to take care to vary the distance between the light source and the screen to achieve this.



Making a circuit



Testing window materials



Further information:
www.pollen-europa.net

Dr Tina Jarvis
Director Science Learning Centre East Midlands
University of Leicester
21 University Road
Leicester LE1 7RF
Tel: 0116 252 3771
Email: jar@le.ac.uk



Booklet produced by Tina Jarvis & Phil Hingley
University of Leicester