ECOBOT'S ENERGY CHALLENGE

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

Lesson Plan: Year 5 — Science

Objectives:
- To give reasons, based on evidence from comparative and fair tests, as to which everyday materials make the best insulators.
- To set up simple practical enquiries, make careful observations taking accurate measurements using standard units.
- To understand that energy can be conserved with the use of insulation.

Cross Curricular Links:
Maths: present discrete data using graphical methods, including line graphs.

Resources:
- Plastic beakers
- Warm water
- Timers
- Data loggers or thermometers
- A selection of materials to test (e.g. fabric, cotton wool, cling film, tin foil, bubble wrap, polystyrene)

Teacher Input:
Tell the children that in order to help save energy, Ecobot is challenging them to think about how to keep things warm for as long as possible. Finding ways of keeping the heat in our homes and schools means we don't waste more energy making more heat. Materials that help to keep things warm or cold are called insulators. Show the following clips on how to keep things warm:
www.bbc.co.uk/programmes/p0118n4j www.bbc.co.uk/programmes/p0118t8z
Explain to the children that they are going to devise an investigation to see which group can keep the most heat in a beaker of warm water for the longest time. Each group will have 3 beakers of warm water and a selection of materials to test as well as thermometers or data loggers to record temperatures. (Demonstrate how to take accurate readings.)
Ask children how they are going to make it a fair test and which variables need to stay the same (starting temperature, volume of water, time intervals etc).
Discuss ideas and make predictions as a class about which will material will be the best insulator.

Independent Activity:
Children to work in mixed ability groups to devise and carry out their investigation, recording their start temperature and taking further readings at 1 minute intervals.
Teacher to measure the temperature of a beaker without insulation as a control. Groups to record their results in their own table or use Resource A.
Discuss results as a class. Children to then use their results to create a line graph to show the change in temperatures for the 3 beakers. Children to write a conclusion to explain which was the best insulator and why.

Other Ideas:
This could be run as a whole class experiment with each group trying out a different material and the results collated at the end.

Differentiation:
H.A. Write a conclusion independently, referring to their line graph.
M.A. Use questions (Resource B) to help them to write a conclusion.
L.A. Use framework (Resource C) to write a conclusion.

Plenary:
How can we use this investigation to help us save energy and help Ecobot?
Ask children to brainstorm ideas about how insulation is used in everyday situations to help keep things warm or cold and save energy. (Loft insulation, cavity wall insulation, water tank jackets, thick curtains, draught- proofing windows and doors.)
Discuss why the materials used are such good insulators.