

Exemplar 27

Conductors and insulators

third to sixth classes

Identifying the problem to be solved

This group of children wanted to find out which materials would make the best switch in their circuit. The children suggested several hypotheses:

I think that all metals can be made into switches.

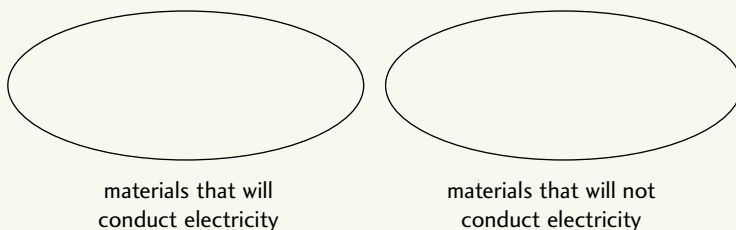
I think that only plastic can be used, because all the switches at home and school are plastic.

I think that only shiny metals can be used.

Planning the test

The children made a collection of different materials—iron, copper, aluminium, coins, plastic spoons, paper, paper clips, rulers, tinfoil, fabric, coat hangers, rubber bands, pencil sharpener and nails.

They then predicted which materials would allow electricity to pass through them. Their predictions were recorded by making two sets



They decided that they would make a circuit using a bulb, battery and wires. A gap would be left in the circuit. Each material would be placed in the gap and tested.

Controlling the variables: fair testing

The children were prompted to consider the fairness of the test. They decided that they would test materials of the same size and thickness.

They placed each of the chosen materials in the circuit. They observed whether the material allowed electricity to pass through.

Recording the results

The children recorded their results. They compared the predictions that were made at the start of the investigation with their results. The teacher prompted them to make sets of conductors and insulators. The children concluded that, in

general, metal is a good conductor of electricity, whereas fabric, paper and plastic are good insulators.

Interpreting the results

The children felt that they had identified a large group of materials that could be used as switches in their circuits but that they had not identified the best metal for making a switch. They decided that they would repeat the test using only metals. They refined the idea to be tested:

Which metal is the best conductor of electricity?

After re-testing, the children identified a small group of objects that they considered to be good conductors of electricity. These included paper clips and nails.

Further ideas for testing were generated. Some children suggested that a metal conductor would be affected by rust, paint, dirt or grease. Children decided to use the paper clips and nails and to repeat the experiments. They had to ensure that the test was fair, so rusty nails, greasy nails, clean nails, dirty nails and painted nails were tested.

The children concluded that metals conduct electricity if they are clean and shiny.

