Environmental education and hearing-impaired pupils

Roger Lock

Student teachers and partially hearing pupils share the benefits of an environmental investigation

Experience that student teachers gain of working with special needs pupils inevitably varies enormously in a one-year post-graduate course. This short article reports on one way in which some student teachers were given opportunities to work with partially hearing pupils in the context of environmental education outside the science laboratory.

The environmental work was set up as an investigation and followed closely some of the suggestions in the ASE book, *Investigating the environment at key stages 3 and 4* (Oakes, 1996) – see Figure 2. Pupils were taken outside on to the school field and shown the 'green stuff' that grows on the bark of some trees. Over a period of three weeks they were challenged to answer three questions:

- What is this green stuff?
- How is it distributed on the tree?
- What causes this distribution pattern?

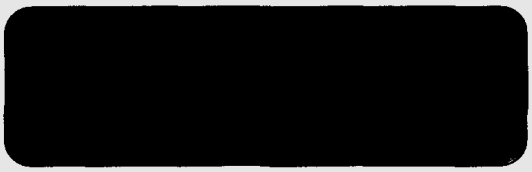
Pupils were organised in small groups, each assigned a different tree, so they had the opportunity of working autonomously on an extended and open-ended investigation. Partially hearing pupils had a large degree of individual attention with five student teachers, the normal class teacher and special needs support all working with them. It was thus possible to provide student teachers with experience both of partially hearing pupils and of whole science investigations in the local environment at the same time.

ABSTRACT
In a Post Graduate Certificate of Education (PGCE) course lasting 36 weeks there is a lot of ground to cover in little time. This article reports on a school-based exercise which provided student teachers with experience of investigations, environmental education and the needs of hearing-impaired pupils.

Investigations

The use of hand lenses provided little insight as to what the 'green stuff' was and the need for higher magnification was readily apparent. For year 7 (11/12 year-old) pupils, use of microscopes soon provided evidence that it was a plant, as cell walls and

Figure 1
Student teacher wearing a radio microphone



Outline

Pleurococcus, an alga, grows on most trees, brick walls, park benches, etc. and so is near most schools. Many pupils are familiar with it because it's the green stuff that comes off on your clothes when you brush against or lean on trees!

Pupils can find out what it looks like, where it grows and why it grows there.

Age group: Y7

Introductory activity

Draw attention to green stuff – raise some questions. Pupils quickly self-drive the activity through their questions and ideas for investigating them.

Resources

- Light meters, thermometers (best done on sunny day). Lots of data logging opportunities.
- *Mini quadrants for "is it evenly distributed?"* Pupils make their own 10 × 10cm quadrats. For instance from card, wire, acetate sheets, graph paper with a 10 cm square hole cut out. If sampling has not been covered before, a preparatory exercise such as sampling on page 17 could be used.
- Paints for "greenness" scale
- pH paper
- Cobalt chloride paper
- test tubes, plasticine, string – to set up tubes around the trunk to collect run off water

Questions

- What does the plant look like? *How can they find this out? (Use a microscope)*
- *Where does it grow? Local survey*
- Does it grow evenly around a tree?
- How can they measure that? *Mini quadrant, N, S, E,W*
- How can the results be presented? *Bar charts, pie charts*
- Is it the same thickness all round a tree? *It is green or greener where it is thicker - devise a scale of greenness*
- Why does it grow where it grows? *Lots of room here for individual theories and ideas to be developed. These might include: light, temperature, moisture of bark, pH of bark, texture of bark, run off water down the trunk, pollution (carbon from cars)*

When the sampling height above the ground has been decided, a piece of string tied around the trunk can be used to locate the quadrats at the same level around the tree.

Outcomes

Lots of graphs, bar charts, pictures, photographs and drawings. Excellent wall displays.

Extension work

Older pupils are likely to come up with ideas that are refinements of the relatively simple ones of eleven year olds. They may for instance take note of a gradient of light intensities and wish to sample a selection of trees along such a gradient. They may also wish to take into account the fact that conditions change over the year and that these have to be taken account of. They are also more

Figure 2

Pages 43 and 44 from Oakes, M. ed. (1996) *Investigating the environment at key stages 3 and 4*, ASE

chlorophyll could be seen. Referring back to lessons on the variety of life and a five-kingdom classification system served mostly to confuse; the green stuff is *Pleurococcus*, a single-celled green algae which would be classified under *Monera* or *Protista* and not *Plantae*.

A variety of methods was used to explore the nature of the distribution. Some pupils made drawings of the trunk or of a strip around the circumference 20 cm wide. Others used semi-quantitative methods, using a 'completely covered (5), lots (4), half covered (3), little (2), none (1)' classification. That shown in Figure 1 was quite sophisticated and based closely on a method suggested in the ASE book. It makes use of a 10 cm by 10 cm grid located at the same level around the tree by means of string round the trunk, and involves counting the presence/absence of the 'green stuff' as well as the thickness of it, based on an approximate intensity of colour scale.

Most groups produced an uneven distribution and came up with a variety of explanations for this which included light intensity, temperature, dampness of bark, height of the trunk from the ground, run-off water down the trunk and sloughing of bark. A range of approaches was used to explore the causes, which took up two weeks' worth of science lessons. Some used test-tubes with Plasticine funnels set up around the trunk to catch run-off water. Dampness of bark was determined by others, who recorded the time taken for blue cobalt

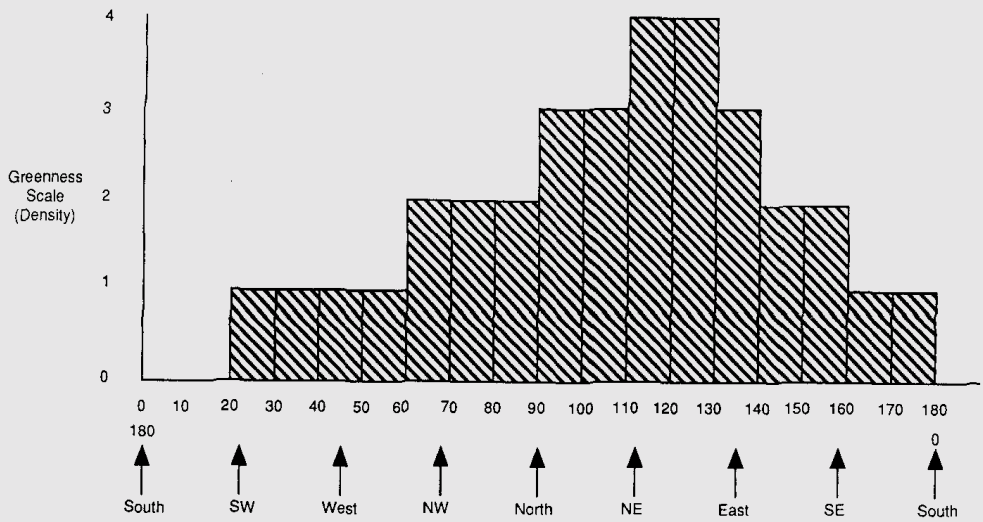
likely to appreciate that without damp conditions other factors may have little impact.

Similar investigations using different organisms are possible. North/south facing walls or fences provide opportunities such as "*Are the leaves of ivy different on the N or S side?*" "*Are the patches of lichen different on the N/S?*" "*Are there any differences in the animals (= woodlouse/spider) on the N/S sides?*"

The basic issues involved here are light and temperature.

When considering the implications of the findings the same questions can be discussed with respect to N or S facing sides of a valley or sides of a school or back and front gardens.

Possible distribution pattern of Pleurococcus around a tree trunk



chloride paper to turn pink. Temperature and light probes were used by some groups, while sloughing of bark required a comparative study of silver birch and oak trees that were growing close to one another.

Partially hearing pupils

Figure 1 shows a student teacher wearing a radio microphone. This amplifies and transmits the sound signal to the pupil's receiver, not visible in the figure. Such a system has been developed to cope with situations where distance between the teacher and pupils is variable. The teacher microphone works most effectively about 15 cm below the mouth and is possibly a little low in the illustration.

The special needs support teacher (second right Figure 3 overleaf) is signing to a profoundly deaf pupil. Another pupil (second left) is using a receiver (not visible) with direct input to two behind-the-ear hearing aids. At all times the on/off control of the teacher's voice rests with the pupil.

Experience gained

Students found it difficult to give pupils control over the nature, content and structure of investigations, but the exercise raised points for discussion on such matters at the debrief that followed the sessions.

There were benefits for all parties involved. The class teacher and special needs support were able to devote more individual attention to pupils, as well as gaining from being involved in an investigation outside the laboratory. The pupils benefited from more 1:1 support, although some found this daunting. Student teachers not only broadened their experience of teaching, but also developed their understanding of investigative science, environmental education and the needs of the partially hearing.

Figure 3
Special needs support with student teacher and partially hearing pupils

Acknowledgements

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Reference

Oakes, M. ed. (1996) *Investigating the environment at key stages 3 and 4*. Hatfield, Herts: Association for Science Education.

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