

So what do
you think a

plant
is?

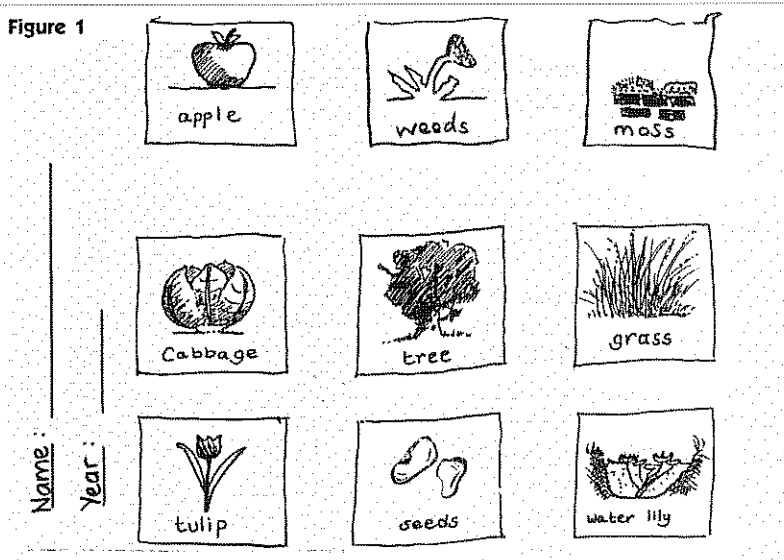
How would *you* define the term 'plant'? With aspects of plant life featuring in Sc2 of the National Curriculum (NC) for England and Wales, we are obliged to provide children with opportunities to learn more about this fundamental feature of human life. It was interesting to explore children's conceptions elicited by the question 'What is a plant?' in a small-scale study I set up to investigate and develop their understanding of the term. It rapidly became apparent that children are rarely given the opportunity to discuss and refine the meanings they give to regularly used scientific terms. The NC requirements often expect children to investigate the properties and behaviour of 'objects', possibly without a clear grasp of their fundamental meaning.

My study aimed to identify key stage 1 and 2 children's conceptions of the term 'plant' in order to develop a sequence of activities

LYNNE BIANCHI
SUGGESTS ACTIVITIES TO
ELICIT AND DEVELOP
CHILDREN'S CONCEPTUAL
UNDERSTANDING

to further their understanding. Thus, the research was set within a constructivist ideology. I also hoped that helping children to become more conscious of their own and others' opinions would improve their learning and metacognitive awareness. Baird *et al.* (1991) considered that the process of eliciting children's ideas improves their opportunity to verbalise, refine and reflect upon their conceptions. The study encouraged children to develop metacognitive awareness by discussing, questioning and evaluating their understandings in a collaborative setting. The collaborative nature of the activities provided a context in which children could debate and investigate their personal

Figure 1

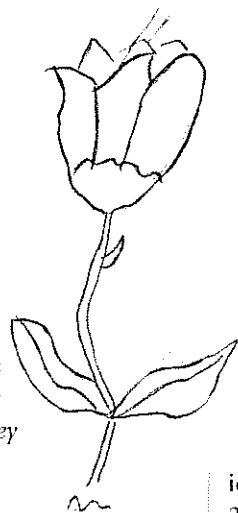


meanings for the term 'plant' using a structured yet adaptable approach.

The study focused heavily on people's interpretation of words and the problems inherent in identifying true and worthy scientific definitions. It raised questions as to why we, as teachers and learners, need to share our interpretations and what relevance they hold for conceptual development. An underpinning feature of the work was that scientific words often conjure up different meanings for different people in different contexts. Although the subject of science relies heavily on 'accepted' definitions, it is well recognised that complete consensus on meaning is probably unachievable. Individuals interpret and construct meaning as a result of past experiences, thus continually modifying and consolidating their preconceptions over time.

Osborne and Freyberg (1985) highlight the relevance of this study:

All too rarely do we find pupils talking about their own conceptualisations of the scientific ideas underlying the 'scientific' activity they are meant to be engaged upon ... if learners are to change their views, or to appreciate what is being taught, it is important that they are clear about their own views.



Eliciting children's ideas

Group interviews, concept cartoons and drawings were used to elicit children's ideas. Children were asked to draw their image of a 'plant' and to vote on whether nine pictures in a set (Figure 1) were plants or non-plants (Keogh and Naylor, 1997). These activities provided data on children's

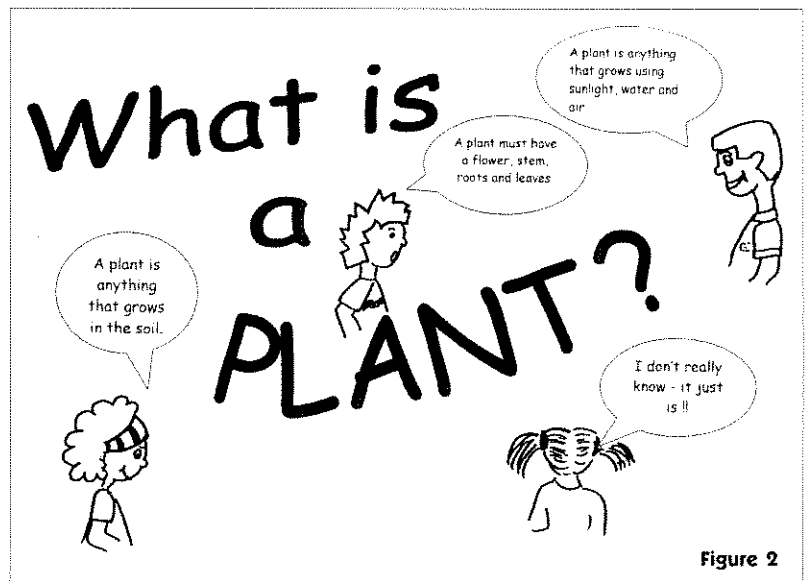


Figure 2

mental images and their awareness of the diversity of plant life. Discussions focused on identifying criteria to classify the pictures and exploring the reasoning behind certain decisions. A concept cartoon was devised to suggest a variety of definitions for the term 'plant' from which children were asked to choose that which best suited their ideas (Figure 2). These activities provided evidence of children's preconceptions as well as setting a baseline for later review.

Evaluating the data

Four main deductions were drawn from the results of elicitation activities:

- Children across key stages 1 and 2 maintained a stereotypical image of a plant.
- Common themes in explanations were

Dominic, Y6

identified across key stages 1 and 2, with an increasing use of scientific vocabulary with increasing age.

- Uncertainties permeated all year groups as to the diversity of plant life; however, awareness improved with age.
- Children relied heavily on previous experiences to generate explanations.

A high proportion of stereotypical images of plants (e.g. flower,

stem, leaves, and roots) and an indiscriminate use of the terms 'plant' and 'flower' illustrated limited or inadequate concept formation. These images seem to be reinforced by NC objectives that focus mainly on the labelling and investigation of flowering plants. Few references are made to more diverse plant-life such as algae, mosses, ferns, etc. School dictionary definitions also seem to perpetuate these stereotypical images.

The most frequent response to the question 'What is a plant?' was 'it grows'. Children's understanding of factors influencing growth and the process of photosynthesis improved with age and experience. Children seemed to recall previous experiences to support their claims. However, one 4-year-old was seemingly misled by these experiences when vividly describing how he had grown a plant:

I put the pip on the floor and put a chocolate digestive biscuit on top of it. Then I poured water over the top and it shot up from the ground into a beanstalk.

Debates took place over whether moss, cabbage, trees and weeds were plants. Children argued that plants were inedible unless they were fruit or vegetables. Trees were plants when they were younger or below specified heights. Weeds were not cultivated and therefore

did not qualify as plants. Lack of direct experience of moss hindered some children's decisions.

Developing the children's ideas

The activities relied heavily on group work, with the sharing of ideas and explanations of thought. Structure was needed to assist younger pupils during negotiations and whole-class plenary sessions regularly addressed issues highlighted in the activities. Many children benefited from these activities, gaining a definite increased awareness of the nature of plant life.

The sequences of activities varied in focus and demand depending on children's awareness of plant diversity, classification skills and the nature of their pre-conceptions. Below is a selection of activities undertaken with a mid-key-stage-2 group of children:

- Voting on concept cartoon.
- Group drawing of a 'plant'.
- Group review of plant-like pictures (with notes taken)

followed by whole-class review to identify differences in opinions. Children encouraged to justify their standpoint.

Opportunity to discuss features, habitat, etc. Teacher to structure children's thinking to identify significant features such as fundamental requirements for living.

- Classification of plant-like pictures. Children asked to group pictures and record their reasoning. Review of this work allows children to begin to develop understanding of the plant kingdom classification system.

Depending on year-group, simple classification exercises can be

developed and exploited.

- Group definitions of plants and identification of dictionary definitions leading to a working definition for the whole class. This can be adapted according to year-group science objectives.

- Review of plant picture promoting discussions of why stereotypical images are held. Reflection on what has been discussed, its implications for what we think, believe and understand.

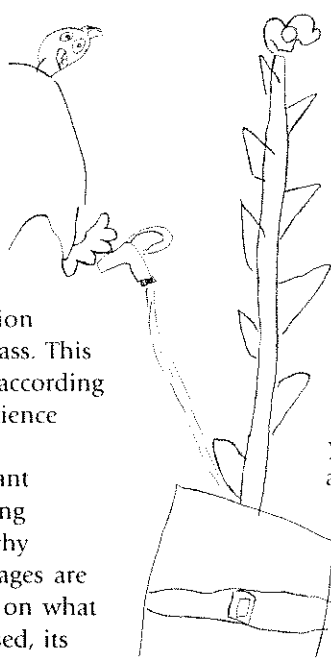
- Revisit concept cartoon. Have our views altered?

Discussion

This seemingly simple term gave rise to a range of questions, heated discussions and independent investigations.

Defining 'plant' stimulated highly reflective processes that were adaptable for all age groups. The opportunity for children to explore their own ideas in this way allows them to become actively engaged with the subject matter, reflecting on and assessing their own beliefs. It allows children to view the knowledge in a wider context and to realise the similarity between the process undertaken by them and more advanced 'scientists'.

This type of session may seem to impinge on the allocated time for science. It is my view that this type of activity can meet NC



of concepts and skills. Set strongly within the constructivist ideology, these activities were enjoyable, interactive and challenging, with their greatest potential lying in their ability to promote conceptual development.

Concept acquisition is a difficult and problematic area to tackle with any year-group. The exploration of words and meanings generates a basis for development that illustrates the true nature of a developing

science. It would be encouraging to see more teachers challenging children to explore the fundamental concepts that are developed in the NC and encountered in daily life. Examining why we are teaching certain concepts, and relating them to a broader and more global context, has beneficial effects when improving the relevance of our work for staff, children and parents alike.

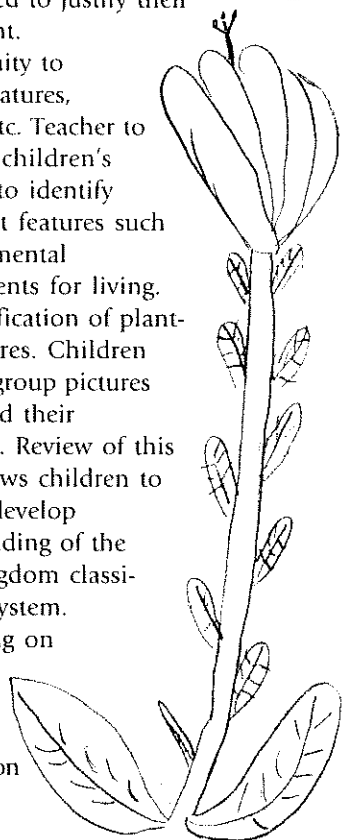
Acknowledgements

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Lynne Bianchi is a primary teacher completing an MA in Education at Manchester Metropolitan University.



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and facilitate the development