King Ecgbert School

Science For All Case Study

A kinaesthetic food web

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Background

This resource was developed in a secondary school with a comprehensive intake and an about average number of SEN pupils. The school has a large Integrated Resource unit for pupils with Asperger's syndrome and those with Autistic Spectrum Disorder (ASD), thus attracting a disproportionate number of pupils to the school with these conditions who are not officially supported by the Integrated Resource.

The issue

The development of this resource was inspired by a visit of some Y8 ASD pupils to an education centre based in local mixed woodland. Here staff used string to link the pupils together to form a woodland food web and explore ideas around conservation.

We felt that the idea could be adapted for use in a mainstream setting with a greater number of pupils.

The key scientific ideas that we wanted to develop with pupils included:

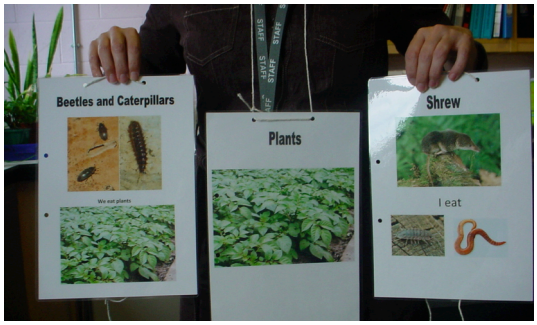
- the complexity of food webs and the interdependence of organisms
- the effect of changing one part of a food web
- energy flow in a food chain
- trophic levels
- bioaccumulation

We realised very early on in the project that the resource would not lend itself to the teaching of ideas about pyramids of number or biomass.

Teachers felt that whilst most pupils could appreciate that there were links between organisms in a habitat, few appreciated the complexity of a food web and fewer still would be confident to discuss abstract ideas such as the flow of energy in a food chain or bioaccumulation. These are higher-level ideas, but we hoped the resource would also help to overcome the common misconception held by pupils of all abilities about the direction in which the arrows in a food chain should point. By dealing with the misconception that the arrows were pointing a*t the foods eaten by* an organism, even lower ability pupils began to think in simple terms about the flow of energy instead.

Implementation

The essence of the resource was to find a way of involving pupils actively in modeling parts of a food web.



Pictures of organisms in a simple food web were printed onto card and laminated, then hung around pupils' necks. Each card had information on it about what the organism eats and pupils had to organise themselves into a web by linking themselves to one another using string.

A number of food webs were trialed, but we settled on woodland and meadows, as the added layer of complexity involved with introducing novel organisms (e.g. a marine food web) distracted from the key ideas we wanted to develop.

We tried attaching the string to the cards directly, but after tying groups of pupils in knots we rescued them and asked them to hold the ends of the string instead. Sadly this was also too much for some pupils, and introduced some class management issues of pupils deliberately dropping their string or tying it to a variety of objects. In order to overcome these issues some teachers tried taking the pupils outside to allow the space to avoid being tangled, and others tried organising them into trophic levels. The trophic levels certainly helped the discussion about energy flow in a food chain, especially when large arrows drawn on folded paper were hung over or pegged on to the strings. The advantages of having the whole class involved in the food web were that all pupils were involved at any time, and that the idea of interdependence was self-evident. Ideas about all food chains starting with green plants, and the number of predators at each trophic level diminishing were unexpected bonuses. Fruitful discussions could be had about the effect of changing parts of the food web, for example – "what happens to the number of foxes if the rabbits all move away?", but the resource had limited value when it came to harder concepts such as bioaccumulation.

An effective method of reducing the impact of string-dropping was to break the food web down into smaller 'sub webs'. A complete food web of 30 cards could be made up from 5 sets each containing six organisms. Each set could stand alone as a small web, or be put together with other sets depending on the size of class.

It was found to be very helpful to transfer the information from the pupil web to a more standard form that pupils would be more likely to encounter in text books or assessments. The cards were removed from the pupils' necks and tacked to the whiteboard and linked by arrows. This consolidated their learning and allowed them to tackle representations of food webs with greater confidence.

Summary

This kinaesthetic model of a food web engaged ASD and SEN pupils with an abstract model and was highly effective as a tool for reinforcing key vocabulary such as predator, prey, producer, consumer as well as highlighting the complexity of food webs. The physical model was limited to basic ideas of interdependence and had less impact with higher ability pupils.