**Food web role play**

blackbird

chaffinch



bee



caterpillar



lavender

cabbage

owl



The diagram shows a food web.

You are going to role play as an organism in the food web.

**To do**

1. Take an organism label and attached it to yourself. This identifies you to the other organisms in the food web. Some may need to eat you! Others may be eaten by you.
2. If you’re a consumer, it’s time to feed! Pick up a string ‘arrow’, and hold the arrowhead in your **left** hand. Now go and find your food. When you have found an organism you can eat, give them the other end of the string arrow to hold in their **right** hand.
3. When the feeding frenzy is over, walk away from your food to pull the arrows tight. The food web is formed!
4. Your teacher will now describe a change to one of the populations in the food web. What effects will this change have on you, and the rest of the community?

*Biology> Big idea BOE: Organisms and their environments > Topic BOE1: Interdependence of organisms > Key concept BOE1.1: Food chains and food webs*

|  |
| --- |
| **Response activity** |
| **Food web role play** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Feeding relationships within a community of organisms can be modelled using food chain and food web diagrams. |
| Observable learning outcome: | Use a food web diagram to predict and explain effects that a change in the size of a population could have on other populations in the same community. |
| Activity type: | Role play |
| Key words: | food web, food chain, population, community |

This activity can help to increase student engagement and help develop their understanding of the interdependence of organisms in a food web. It can be used in response to misunderstandings revealed by the following diagnostic question:

* Diagnostic question: Through the food web

**What does the research say?**

Food webs are key concepts that enable the development of understanding of more complex ecological principles and environmental issues, including population management and food security (Alexander, 1982). As Allen (2014) has pointed out, “Anyone who is not able to fully appreciate the far-reaching impacts of changes to a single population may trivialize a media report about an endangered species, only believing that species alone is under threat, when the likelihood is that many members of an ecosystem will be adversely affected”.

Griffiths and Grant (1985) drew a distinction between students’ ability to recall that populations in a food web interact, and their ability to apply that principle to predict possible effects of a change in one population on others in the same food web.

Research has shown that when students are asked to predict possible effects of a change in a population within a food web, they tend to focus only on single food chains within the web, struggle to trace changes through more than one chain, struggle to think about the impact of a change in a population more than one trophic level away, and are more able to trace changes upwards through a chain than downwards (Webb and Boltt, 1990; Leach et al., 1992; Gotwals and Songer, 2010; Griffiths and Grant, 1985; Barman, Griffiths and Okebukola, 1995). These authors and others have identified specific misunderstandings about changes in food webs that are commonly held by school children, including that:

* a change in the size of a population will only affect another population if they are related as predator-prey;
* a change in the size of a population will only affect other populations in the same food chain within a food web (and will not affect populations in other food chains within the food web);
* if the size of one population changes, all other populations in the food web will change in the same way (e.g. a decrease in one population means all other populations will also decrease).

A number of authors have suggested using interactive activities to increase engagement and help develop students’ understanding of food chains and food webs, including role play (e.g. Ford and Smith, 1994).

**Ways to use this activity**

In this whole-class activity, students role play as the populations of organisms within a food web. The food web they create is used to model how a change in the size of one population affects other populations throughout the community.

The organisms in the food web depicted on the student worksheet can be used for this exercise, or can of course be substituted for other organisms that may be more familiar to the students – ideally which have been identified by the students themselves during a visit to a local ecosystem.

Procedure

1. Give organism labels to students so that there is at least one student representing each population in the food web.

*For a more sophisticated model, you may want to adjust the relative numbers of organisms (students) in the populations in each trophic level to more closely reflect the ‘pyramid of numbers’ or ‘pyramid of biomass’ that would exist in a natural ecosystem. You could ask the students to think about why these pyramids are formed. If necessary, one student can represent many organisms in a population in one of the lower trophic levels.*

1. Give each student representing a consumer a string arrow, and tell them to hold the ‘arrowhead’ end of the string in their left hand. If a consumer eats more than one different species, they should be given one string arrow for each species.
2. Tell the students representing consumers to move around and find their food. Students representing producers should stay still. When a consumer has found its food, they should give them the other end of a string arrow to hold in their right hand.
3. When the ‘feeding frenzy’ is over, tell the students to walk away from one another to pull the strings tight. A model of a food web is formed.

*At this point, students could be asked questions such as which of them are competing for the same food, and which of them are dependent on only a single source of food.*

1. You should now describe a change to one of the populations in the food web. For example: a population has been wiped out by a disease, or over-hunting, or destruction of their habitat; or a population has increased in size due to a warm spring. If a population decreases in size, some or all of the students representing that population should sit down and drop their ends of the string arrows; the student holding the other end of a dropped arrow should also drop it, and if this represents their only source of food they should sit down. If a population increases in size, additional students and string arrows should be added, which will create new feeding relationships with other populations.
2. Ask students to role play how the effects of a change in the size of one population spread through the food web to change the sizes of other populations in the community.

**Equipment**

For the class:

* organism labels (e.g. sticky notes, lanyards, clip-on name cards, badges, etc.)
* ‘arrow’ strings (lengths of string, adapted to make arrows e.g. by attaching two short pieces of string or a triangular piece of card to one end)

**Acknowledgments**

Developed by Alistair Moore (UYSEG), adapted from an idea described by Ford and Smith (1994).

Images: cabbage – pixabay.com/OpenClipart-Vectors (1299145); caterpillar – adapted by UYSEG from pixabay.com/Clker-Free-Vector-Images (30648); chaffinch – pixabay.com/OpenClipart-Vectors (153030); lavender – pixabay.com/55rova (3237000); bee – pixabay.com/Clker-Free-Vector-Images (297305); blackbird – pixabay.com/OpenClipart-Vectors (154654); owl – adapted by UYSEG from pixabay.com/Clker-Free-Vector-Images (46506)

**References**

Alexander, S. K. (1982). Food web analysis: an ecosystem approach. *American Biology Teacher,* 44**,** 189-190.

Allen, M. (2014). *Misconceptions in Primary Science, 2nd* ednBerkshire, UK: Open University Press.

Barman, C. R., Griffiths, A. K. and Okebukola, P. A. O. (1995). High school students' concepts regarding food chains and food webs: a multinational study. *International Journal of Science Education,* 17(6)**,** 775-782.

Ford, B. and Smith, B. M. (1994). Food webs and environmental disturbance: what's the connection? *American Biology Teacher,* 56**,** 247-49.

Gotwals, A. W. and Songer, N. B. (2010). Reasoning up and down a food chain: using an assessment framework to investigate students' middle knowledge. *Science Education,* 94(2)**,** 259-281.

Griffiths, A. K. and Grant, B. A. C. (1985). High school student's understanding of food webs: identification of a learning hierarchy and related misconceptions. *Journal of Research in Science Teaching,* 22(5)**,** 421-436.

Leach, J., et al. (1992). Progression in conceptual understanding of ecological concepts by pupils aged 5-16. University of Leeds, UK: Centre for Studies in Science and Mathematics Education.

Webb, P. and Boltt, G. (1990). Food chain to food web: a natural progression? *Journal of Biological Education,* 24**,** 187-190.