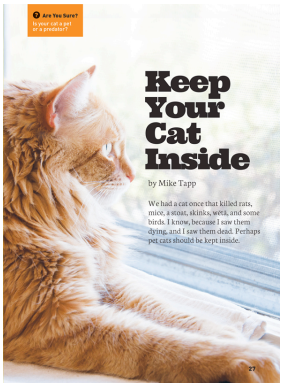
CONNECTED, LEVEL 4 2013, Are You Sure?

Keep Your Cat Inside

by Mike Tapp



Overview

"Keep Your Cat Inside" uses the debate over the impact of domestic cats on native wildlife to encourage students to think critically about the quality of data, and to make connections between investigations, the quality of data gathered, and the interpretations made from the data.

A Google Slides version of this article is available a www.connected.tki.org.nz.

Science capability

Students need to develop a set of **capabilities** that support them to ask informed questions if they are to participate as "critical, informed, responsible citizens in a society in which science plays a significant role". The capabilities enable students to meet the achievement objectives in a way that supports the purpose of science in *The New Zealand Curriculum* and the development of the key competencies. These capabilities include being ready, willing, and able to **gather and interpret data**. Students need to understand what counts as evidence in science, the importance of observation, and the difference between observation and inference.

Text characteristics

- Abstract ideas and concepts that require interpretation
- Complex layers of meaning that require students to make judgments
- Scientific vocabulary and terminology.

Curriculum context

SCIENCE

NATURE OF SCIENCE: Understanding about science

Achievement objective(s)

L4: Students will identify ways in which scientists work together and provide evidence to support their ideas.

NATURE OF SCIENCE: Investigating in science

Achievement objective(s)

L4: Students will build on prior experiences, working together to share and examine their own and others' knowledge.

L4: Students will ask questions, find evidence, explore simple models, and carry out appropriate investigations to develop simple explanations.

LIVING WORLD: Participating and contributing

Achievement objective(s)

L4: Students will use their growing science knowledge when considering issues of concern to them.

L4: Students will explore various aspects of an issue and make decisions about possible actions.

LIVING WORLD: Ecology

Achievement objective(s)

L4: Students will explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.

Key Nature of Science ideas

- Science knowledge is based on direct, or indirect, observations of the natural physical world.
- Scientists gather data, using their senses to make observations.
- Making careful observations often involves measuring something.
- Observations are influenced by what you already know.
- Scientific evidence is valid if it is reliable, relevant, and gathered methodically.
- Good scientists use a range of skills that are valuable in all aspects of life. These skills include problem solving, thinking, predicting, and making connections.
- New technology can provide a source of data that challenges previous findings.

Key science ideas

- Living things depend on one another and on the non-living environment in which they live.
- If there are changes in the population of any species living in a habitat, other species there may be affected too.

ENGLISH

READING

Ideas

L4: Students will show an increasing understanding of ideas within, across, and beyond texts.

INDICATORS

- Makes meaning of increasingly complex texts by identifying and understanding main and subsidiary ideas and the links between them.
- Makes connections by thinking about underlying ideas within and between texts from a range of contexts.
- Recognises that there may be more than one reading available within a text.
- Makes and supports inferences from texts with increasing independence.

THE LITERACY LEARNING PROGRESSIONS

The literacy knowledge and skills that students need to draw on by the end of year 8 are described in *The Literacy Learning Progressions*.

Scientific investigation

A science investigation where you change or try something and observe what happens is called an experiment. Not all scientific investigations are experiments; there are many ways of investigating in science. *The New Zealand Curriculum* science achievement aims indicate that students should experience a range of approaches to scientific investigation including classifying and identifying, pattern seeking, exploring, investigating models, fair testing, making things, and developing systems. Many scientific investigations involve systematic observation over time of an object, an event, a living thing, or a place.

Some important things to remember when you do a scientific investigation are: to be systematic and fair; to make sure that only one thing is changed at a time if you are doing an experiment or fair test so you are sure which changes result in which outcome; to observe and record what happens very carefully; and to be open minded so you notice things you are not expecting.

Sound data is obtained when you are able to get similar outcomes each time you do the same thing, or when data has been collected in the same way and in a systematic manner. No investigation or experiment results in a "wrong" outcome. You may have done something differently from others or the conditions may be slightly different so you don't get the same result as others do, but it is not "wrong".

Thinking about and developing explanations about why things happen the way they do, based on evidence, is an important aspect of science. Another important aspect is critically evaluating methods and ideas. Part of a scientist's work is critiquing and evaluating the methods and ideas of other scientists. They expect their work to be subject to critique. If they are going to be able to make informed decisions about scientific issues as responsible citizens, students first need to experience a range of approaches to scientific investigation and to practise critique and evaluation of scientific methods and ideas – both their own and those of others – just like scientists do!

Meeting the literacy challenges

The following strategies will support students to understand, respond to, and think critically about the information and ideas in the text. After reading the text, support students to explore the key science and technology ideas outlined in the following pages.

TEXT CHARACTERISTICS

- Abstract ideas and concepts, and lengthy sections of explanatory text
- Illustrations, photographs, text boxes, diagrams, maps, charts, and graphs, containing main ideas that relate to the text's content
- Scientific vocabulary and terminology.

TEACHER SUPPORT

Want to know more about instructional strategies? Go to:

http://literacyonline.tki.org.nz/Literacy-Online/Teacher-needs/Pedagogy/Reading#Years5-8

http://literacyonline.tki.org.nz/Literacy-Online/Student-needs/National-Standards-Reading-and-Writing

http://www.literacyprogressions.tki.org.nz/

"Working with Comprehension Strategies" (Chapter 5) from *Teaching Reading Comprehension* (Davis, 2007) gives comprehensive guidance for explicit strategy instruction in years 4–8.

Teaching Reading Comprehension Strategies: A Practical Classroom Guide (Cameron, 2009) provides information, resources, and tools for comprehension strategy instruction.

INSTRUCTIONAL STRATEGIES

FINDING THE MAIN IDEAS

ASK QUESTIONS to support students to identify the main ideas.

- *What does the title suggest the article is about? Why?*
- *How do the visual features on pages 30–31 support your predictions about the content?*

PROMPT the students to make a connection to the debate about banning cats because they catch native birds. Read page 27 and ask questions to encourage them to identify and make an initial response to the central question.

- *What is the question on the author's mind?*
- *What is your response?*
- *What are your reasons?*

RECORD the students' reasons without comment, and then ask them to consider whether they are founded on sound evidence or just personal experience. **DISCUSS** what kind of evidence might be needed in order to make an informed decision and how it could be collected.

As they read the article, the students could **RECORD** their responses on a PMI chart (Plus, minus, Interesting).

After the reading, **PROMPT** the students to explain whether the information and ideas in the story confirmed their initial response or changed it, and why.

- *Have you changed your opinion? On what basis?*
- *Which evidence cited in the article supports keeping cats in at night?*
- *What evidence suggests that keeping cats inside at night is not a complete solution to protecting native birds?*

On the basis of what they have read, have the students develop a set of criteria for what is "good" scientific evidence.

DEALING WITH SCIENTIFIC VOCABULARY

Have the students scan the text and **LOCATE** the vocabulary associated with scientific method – examples include "evidence" and "data".

Prompt the students to work in small groups to construct definitions for each term using their prior knowledge, information from the text, and classroom resources, such as dictionaries. **DISCUSS** the definitions, working towards agreement on a short glossary of these key terms that will become part of the regular classroom language.

REFLECTING ON THE TEXT

The text includes evocative language, such as "silently swoop through the dark" and engaging features, such as the inclusion of questions and the use of the first person. These could be used as a model for teaching creative non-fiction writing. For example, you could **PROMPT** the students to respond to the text by writing a persuasive argument for or against keeping cats inside at night. They will need to provide evidence and explain each point of their argument, while also considering the impact on the reader.

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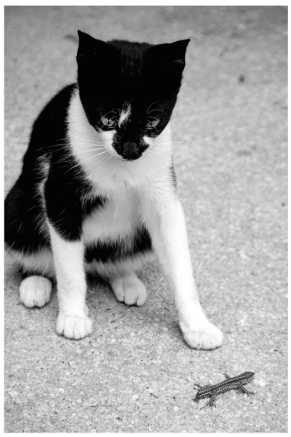
Teacher support



Removing a rat from a DOC 200 trap

28

It looks like they're guilty

Reputable organisations, such as the Royal Forest and Bird Protection Society of New Zealand (Forest & Bird), the Department of Conservation (DOC), and the Wildbase Hospital at Massey University are concerned about cats. The role of these organisations is to protect and care for New Zealand's native wildlife. They say that responsible cat owners should keep their cats inside to protect our native species, at least at night.

What have they observed – and what data have they gathered that supports this belief?

The Wildbase Hospital treats many native birds and reptiles that are the victims of ferocious cat attacks. Their records list kākāpō, kiwi, black stilts, and kererū (wood pigeon) as victims. That's bad. Things don't look good for cats.

But then again

Not many pet cats live near kiwi and kākāpō anymore. There's a good chance that it was feral or wild cats that attacked the Wildbase Hospital victims. But what if the main thing that pet cats kill is rats?

Rats raid nests, kill chicks, eat skinks and, in winter, eat the insects that native animals need for food. I'd like to think that my cat killed mostly rats. I used to find headless rats in my garden.

Is this evidence convincing enough?

Scientists work together and provide evidence to support their ideas.

Scientists explore various aspects of an issue and make decisions about possible actions.

Living things depend on one another and on the non-living environment in which they live.

A night-time conclusion

Scientific research shows that many of our **endemic** animals are more active at night. Tree wētā use that night time to climb trees to feed on young leaves and flowers, and ruru (morepork) swoop silently through the dark, hunting prey. Along the coast, little blue penguins, the smallest of all the penguins, return to land at nightfall. Some skinks and geckos are most active at dawn and dusk, hunting for spiders, slaters, and beetles.

One conclusion from this reliable and relevant evidence is that many of our native creatures are in greater danger from predators at night.

Gecko

Tree wētā

What is significant evidence?

Good scientific evidence comes from reliable information. If you and other people keep repeating an experiment and keep getting the same answers when you repeat that experiment, then the information you end up with should be reliable. If you keep getting very different answers, then your data is not reliable. You will need to think about why you might be getting different results. You will need to examine your **methodology**, what you are measuring and observing, and what might be happening. Evidence is valid if it is reliable, relevant, and gathered methodically. Relevant means that the observations you make and the data you gather give you information about the object you are investigating. Evidence that is reliable and valid can be used to make conclusions. These conclusions are scientific statements about things that are correct.

29

Observations are influenced by what you already know.

Scientists use a range of skills, including problem-solving, critical thinking, predicting, and making connections.

If there are changes in the population of any species living in a habitat, other species there may be affected too.

Exploring the science

Some activities focus directly on the science capability of "gathering and interpreting data" and the Nature of Science strand. Other activities extend student content knowledge. You are encouraged to adapt these activities to make the focus on Nature of Science explicit and to support students to develop the capability to collect and interpret data.

LEARNING FOCUS

Students make observations, gather data, and interpret and discuss outcomes based on their observations.

KEY SCIENCE IDEAS

Key Nature of Science ideas

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LEARNING ACTIVITIES

Activity 1: Digging deeper

Take a closer look at Studies 1 and 2 and compare the results.

- *Looking at each study separately, what are some conclusions that you might draw from these results?*
- *Are the conclusions the same for the two studies? What might explain any variations? Could this be a consequence of the methodology or a natural consequence of the studies having taken place in two different environments?*
- *From the information you have here, which of the studies might be more valid and reliable?*

Extension

Students will have noticed that the Dunedin study had a much larger sample size. You could use the data sets on the CensusAtSchool New Zealand website to develop their understanding that you need a certain sample size before you achieve consistent and reliable data. You could do this by making a statement about handedness, then testing it, first with just two participants and then with increasing numbers of participants.

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Activity 2: Cats in our place

Work with the class to design an investigation that your class could carry out to examine the amount and nature of prey caught by cats in your community.

- *What data will we collect? How?*
- *What are the limitations of our study? What data do we not have access to? How does our sample size affect our study?*
- *How do our findings compare with those discussed in the article? How reliable do you think our findings are? Why?*

Read the cat owners' code of conduct (see resources) and discuss whether or not it is helpful.

Activity 3: You be the judge

Australia's rainbow lorikeets are as colourful as their name. That's probably why an Auckland man bred the parrots in his aviary. But then he let them go. He was taken to court because, in New Zealand, rainbow lorikeets are an "unwanted organism"– a pest species. It's illegal to release them.

Have students look at the evidence below and decide if it's relevant. What other evidence would be useful in making a decision about releasing lorikeets?

Students could do some further research themselves. (If using the Internet, try entering "rainbow lorikeets" + "release".) If the evidence is reliable and relevant, it's valid.

Rainbow lorikeets:

- are not native to New Zealand but some Australian birds are (silver-eyes and white-faced herons flew here on their own so they're native)
- were released in an urban area with a lot of exotic flora and fauna (including introduced plants and animals – it wasn't in an area of native bush)
- have been seen in flocks of up to 50 and are now breeding in the wild
- may threaten native honey eaters, such as tūī, bellbirds, and hihi/stitch-birds, competing for pollen and nectar by flying to flowering trees in flocks
- nest in hollow limbs and the trunks of dead and living trees (and hihi/stitch-birds, kākā, and kākāriki are hole nesters too and already have to compete with introduced birds, such as the mynah)
- are good breeders – a pair can have three broods (groups of chicks) in a single season
- might fly to islands of native forest near Auckland that are sanctuaries for rare native birds.

Activity 4: Critical thinking

Examine examples of claims in newspaper and television reports about keeping your pet inside or limiting the number of pets you can have.

- *What evidence is there? How was data collected?*

Discuss what kinds of data would give a reliable picture of the situation.

- *Are there other possible explanations? What else would we need to know to be more certain?*

If possible, design and evaluate a data collection process. Gather, present, interpret, and evaluate the data to come to a conclusion about the validity of the claim.

- *How much reliance would you place on your data? Why? What would improve its reliability?*

Activity 5: Can we do it?

The students could design and complete a simple observation investigation where they plan an investigation to observe birds in a particular habitat over a period of time and see if they can collect reliable data and draw conclusions from it. It will need to include information on systematic data collection and variable conditions (that is, the conditions that may vary and therefore affect the result of the investigation).

Activity 6: Building solutions

A range of predators kill birds, animals, and reptiles. Bird nesting boxes and feeding tables can protect vulnerable species.

The students could research this issue and decide how they could use their technological knowledge and skills to make protective environments for a range of birds and/or animals. Their investigation could have a further environmental focus – by incorporating the use of recycled materials. If practicable, the students could also monitor and record the outcomes achieved through their product. See the resources list for examples of projects and products.

Google Slides version of "Keep Your Cat Inside" www.connected.tki.org.nz

RESOURCE LINKS

Science Learning Hub: Myths of the Nature of Science http://www.sciencelearn.org.nz/Nature-of-Science/Myths-of-the-nature-of-science

CensusAtSchool New Zealand http://new.censusatschool.org.nz/

Wellington Regional Council http://www.gw.govt.nz/cats-and-native-wildlife/

Cat Owners' Code of Conduct http://www.forestandbird.org.nz/files/file/CatFactsheet.pdf

Rainbow Lorikeet Factsheet http://www.biosecurity.govt.nz/pests/rainbow-lorikeet

Building a Nesting Box http://crittertude.com/starling/nest.php and http://www.bto.org/nnbw/make.htm

New Zealand Native Bird Boxes and Feeder http://backyardbirds.co.nz/bird_feeding1.htm

Wētā Condominium www.teara.govt.nz/en/weta/page-2

Newspaper articles and YouTube videos: search "cats" and "pests"

"It Seemed Like a Good Idea at the Time" *Connected* 3, 2011

ISBN 978 0 478 40672 6 (web)