



LEVEL 1 2 3 4 5

Worms That Hear

THE LEARNING CONTEXT

The teacher's intended outcomes were for the students to:

- recognise patterns and relationships in the results of an investigation
- use investigation results to answer an investigative question
- use data to support or change an idea.

The intended outcomes were aligned to the following "big ideas":

- Processing and interpreting are important in answering investigative questions.
- Scientists use evidence to justify their ideas.

The students carried out their work as part of a nine-week-long, school-wide, cross-curricular unit involving social studies, technology, health and physical education, and science. Integrating these subjects allowed the school to focus on revamping a native bush area at the school. The key principle of the unit was that the New Zealand bush is an ecosystem with plants, soil, and soil organisms all dependent on each other. Investigating was the key scientific skill, with a focus on processing and interpreting results. The students assessed their ability to process and interpret results after they'd completed the unit.

Each of the three rooms at the school used a slightly different context. In the junior room, the focus was on growing bean seeds (see *Bushy Beans*, level 1), in the middle room, the focus was on soil animals (specifically, worms, as in this exemplar), and in the senior room, the focus was on growing native seeds (see *Cola and Kōwhai*, level 4). All the rooms followed the same sequence of topics as they moved through the unit:

- Week 1: living and non-living things, simple characteristics of living things
- Week 2: grouping according to observable characteristics
- Week 3: revamping the native bush area
- Weeks 4-8: individual investigations.

Alice, who was in the middle room, noticed that she couldn't see any ears on the worms she had observed. She decided to investigate whether they could "hear".

Teacher-student conversation

Examining Alice's table of results:

Teacher: Tell me about the results of your investigation.

Alice: We wrote in the boxes to say "Yes" or "No" if the worm stopped when we made the noises.

Teacher: Do these results begin to show a pattern?

Alice: Some of them stopped for the pencil. All except one of them stopped for the duster, but no worms stopped for the clap or the whistle.

WHERE TO NEXT?

To move Alice towards the next learning step, the teacher could help her to focus on:

- using evidence by using prompts such as "Alice, is there any other evidence that you could use to support your idea that worms don't have ears?" (thinking in scientific ways)
- organising data by using prompts such as "Alice, can you draw me the table that you would use to record data the next time?" (investigating in science).

The teacher could:

- ask Alice to explain what she thinks might happen and to justify her explanation before beginning the next investigation
- ask Alice to construct her own table to record data for the next investigation.

CURRICULUM LINKS

Science in the New Zealand Curriculum

Achievement Objectives

Level 3: Making Sense of the Nature of Science and Its Relationship to Technology

Students can recognise when simple investigations can be classified as a "fair test" and make decisions about the worth of results.

Science in the New Zealand Curriculum, page 30
http://www.tki.org.nz/r/science/curriculum/p30_31_e.php

Levels 3 and 4: Developing Scientific Skills and Attitudes

Students will further develop their investigative skills and attitudes.

Science in the New Zealand Curriculum, page 42
http://www.tki.org.nz/r/science/curriculum/p42_43_e.php

Note: This is the achievement aim and as such includes all the achievement objectives at level 3.

Level 3: Making Sense of the Living World

Students can:

- investigate special features of common animals and plants and describe how these help them to stay alive
- explain, using information from personal observation and library research, where and how a range of familiar New Zealand plants and animals live.

Science in the New Zealand Curriculum, page 58
http://www.tki.org.nz/r/science/curriculum/p58_59_e.php

REFERENCE

Ministry of Education (1993). *Science in the New Zealand Curriculum*. Wellington: Learning Media.



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WHAT THE WORK SHOWS

Initially, Alice set up this table with guidance from the classroom teacher, but during the investigation, she recorded her data accurately without teacher assistance. She has been able to make sense of her data and provide an appropriate conclusion.

Worm Investigation

What is my question?
Do worms hear things

My Prediction: (What do I think will happen?)
I think they would stop moving when we made all the noises. I think they have ears so they could hear noises.

Investigation Results:

		<i>Eath worms</i>			
		<i>Pencil</i>	<i>Duster</i>	<i>clap</i>	<i>wisil</i>
<i>Test 1</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>
	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>
	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>
	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
		<i>Tiger worms</i>			
<i>T1</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	
<i>T2</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	
<i>T3</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	
<i>T4</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	
<i>T5</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	

Alice's table

Progress Indicator Investigating in Science

Using systematic approaches to scientific conventions

Alice shows in her table of results that she is beginning to *plan and carry out more systematic trials, using measurement to identify patterns and test ideas.*

Processing and interpreting

In Alice's response to the question "What did I find out?" she reaches a *conclusion for a simple investigation linked to her own understanding.* This is a level 2 indicator. However, her table shows that she is also able to *organise data to display obvious trends and patterns and to reach conclusions,* an indicator at level 3 (L2–3).

Evaluating the investigative process as a continuous activity

Alice's answer to the question "What could you do better next time?" demonstrates that *with support, she can suggest improvements, such as the need for repeated measurements and fair testing when carrying out an investigation.*

Reporting

Alice *presents an organised report, and she links her findings to her observations.* For example, she refers to her observations and reports that both types of worms could not hear the clap or whistle ("wisil"), yet they could respond to the pencil and duster vibrations.

Progress Indicator Thinking in Scientific Ways

Suggesting explanations

Alice *suggests explanations supported by some evidence.* However, she has some difficulty in justifying her explanation.

Comparing and evaluating explanations

The opening statement in Alice's conclusion indicates that she can *change her ideas in the light of the evidence* in a simple context.



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Conclusion: (What did I find out?)

I know worms don't have ear just because it vibrated. The worm only stops for the pencil and the duster but not for the clap or the whistle. And so did the tiger worm. It don't stop to the clap or the whistle but it stopped to the pencil and the duster. It stop because it was inside the box it was vibrated and moving the box.

Alice's conclusion

What was your thinking behind the boxes that you ticked?

I could see the differences between the pencil and the whistle. I could also see other differences between the duster and clapping. I did the recording on the table. Some worms stopped and some kept moving when I made the noises. That means that they don't have ears?

What could you do better next time?

When I was doing the tapping I would tap four times and I would tap harder. I would do all of them four times.

Alice's evaluation (recorded by her teacher)