



LEVEL	1	2	3	4	5
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What a Mix-up!

THE LEARNING CONTEXT

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

- use their ideas and personal observations to make predictions
- make observations
- share what they did and what they found out in their investigations
- record information in a systematic way
- describe and explain, using appropriate vocabulary, the physical properties of substances
- describe how substances combine and the changes that occur.

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

- Physical properties include smell, colour, texture, and strength.
- When substances are mixed together, they usually react or combine in some way.
- When substances are mixed together, they can change to form new substances.
- Scientists have systematic ways of working and use specific scientific conventions.

The students had not had any experience of carrying out investigations in the Material World strand. The teacher used the context of mixing substances and observing reactions to develop a simple investigative process in which the students could use appropriate scientific conventions.

The class began by brainstorming their ideas about chemicals and asking others at home for their ideas. They then discussed investigating, and the teacher recorded their ideas. She introduced the investigation sheets and modelled the process by mixing vinegar and warm milk to make casein plastic.

The students worked through their own investigations with support from the teacher. They discussed and evaluated the process and discussed the scientific ideas. They carried out further investigations on subsequent days, during which they mixed flour and water, cornflour and water, and vinegar and baking soda. Finally, they recorded and shared their ideas from the data they'd collected on the investigation sheets.

Teacher-student conversation

Discussing Georgia's explanation:

Teacher: Tell me what you mean when you say "The baking soda dissolves into the vinegar and becomes vinegar again."

Georgia: I mean that at the end you can't see the baking soda any more. The vinegar still looks like vinegar, even though it's got baking soda in it. You can't tell that by looking.

Teacher: In what way is that different from when you mixed milk and vinegar?

Georgia: Milk and vinegar made something that looked totally different – not like milk and not like vinegar.

WHERE TO NEXT?

To move Georgia towards the next learning step, the teacher could help her to focus on clarifying her ideas about dissolving chemicals, chemical reactions, and solids and liquids through further experiences and careful questioning. For example, the teacher could ask Georgia:

- How could you tell if something was solid?
- What words could you use to describe a solid?
- What do you think of the idea that solid things always stay in the same shape?
- Tell me what ideas you have about liquid things? (investigating in science; developing and communicating scientific understanding).

The teacher could:

- provide more opportunities for Georgia to investigate in different contexts
- encourage Georgia to ask her own investigative questions
- help Georgia to reach conclusions and to link her findings to her own ideas
- provide further opportunities for Georgia to share and clarify her ideas and use the scientific vocabulary correctly (for example, by listing the physical properties of substances, identifying chemical reactions that can take place, and describing how substances can change)
- encourage Georgia to make links to other experiences.



LEVEL 1 2 3 4 5

What a Mix-up!

CURRICULUM LINKS

Science in the New Zealand Curriculum
Achievement Objectives

Level 1: Making Sense of the Nature of Science and Its Relationship to Technology

Students can use a variety of methods to investigate different ideas about the same object or event.

Science in the New Zealand Curriculum, page 28

http://www.tki.org.nz/r/science/curriculum/p28_29_e.php

Levels 1 and 2: Developing Scientific Skills and Attitudes

Reporting: Students can share what they did and what they found out in their investigations in whole class situations or in groups.

Science in the New Zealand Curriculum, page 47

http://www.tki.org.nz/r/science/curriculum/p44_51_e.php

Level 1: Making Sense of the Material World

Students can:

- group familiar objects, using observable physical properties
- investigate and communicate differences in the properties of similar types of materials
- investigate and describe everyday changes to common substances.

Science in the New Zealand Curriculum, page 92

http://www.tki.org.nz/r/science/curriculum/p92_93_e.php

REFERENCE

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



LEVEL 1 2 3 4 5

What a Mix-up!

WHAT THE WORK SHOWS

This exemplar demonstrates the teacher using assessment for feedback as she engages in conversation with Georgia.

Georgia has engaged in a rich set of practical learning experiences. This exemplar shows that she recorded her investigations systematically and used her observations to form conclusions.

We are talking about investigations, and when we mix cornflour and water together it looks runny, but when you touch it, it's solid but can still run down the container, but it will be sticky to touch, too. When Mrs Sharp touched Te Huinga's piece of work and when she pulled out her finger, a sort of sticky rope came with her finger. When we mix vinegar and baking soda together, the baking soda dissolves into the vinegar and becomes vinegar again. When we mix milk and vinegar together it makes plastic, and Georgia F made dough and cooked it. When you mix all sorts of chemicals together, it might make plastic, soft dough, and rough dough, and other things, too. When chemicals react to each other, anything could happen. Solid, hard, soft or middle soft could turn liquid. Solids like wood could turn liquid. There could be other chemical reactions to each other, but we don't know until we can find out. When we find out about the chemicals reacting, we might be able to do them at home if you have got the ingredients at home in the fridge or cupboard or pantry.

Georgia's explanation

A science investigation

What am I going to find out?
 What happens when we mix vinegar and baking soda together.

What do I think will happen?
 the baking soda, might dissolve
 It might go Fizzy
 It might bubble

How I found out.
 I put ~~one~~ ^{four} part 1 teaspoon of baking soda, and 1 teaspoon of vinegar into a ~~plastic~~ ^{plastic} container

What I found out.
 When we poured it in the vinegar it went Fizzy and bubbled up the bubbles went up the down and the soft baking soda dissolved

Georgia's investigation sheet

Progress Indicator Investigating in Science

Making predictions

Georgia is able to *predict possible outcomes* to the question posed by the class and the teacher.

Using systematic approaches and scientific conventions

Georgia *carries out simple trials based on her class's ideas and collects relevant data* in a systematic way.

Processing and interpreting

When reporting on her investigation, Georgia *reaches some conclusions* as to why the reactions occurred, which she attempts to *link to her own knowledge*.

Reporting

Georgia *reports on her investigations in an organised way*, referring to her observations to support her ideas.

Progress Indicator

Developing and Communicating Scientific Understanding

Using scientific ideas in constructing an explanation

Georgia is able to *offer an explanation for experiences using some scientific ideas*. She can explain her observations and describe the physical properties of substances (for example, "solid", "sticky").

She has an idea about solids and liquids with some understanding of scientific ideas, but she is unable to link what she has observed with those ideas. She is able to make links to the wider world as she identifies where and how she might use some of the everyday substances the class investigated.

Using scientific vocabulary

Georgia *experiments with vocabulary* to describe her scientific ideas and experiences, for example, "dissolve", "fizzy", and "bubbled up".