

General themes for *Connected 1 2010: Staying Warm, Keeping Cool*

The conservation of heat energy through insulation is the overarching theme of the five articles in *Connected 1 2010: Staying Warm, Keeping Cool*.

“Warming Up, Cooling Down” introduces explanations of how some living things, including humans, have, over time, developed life processes that allow them to monitor and control their body temperatures at optimum levels. Examples of keeping warm and cooling down in a number of contexts are introduced and explored. Humans have used their knowledge of the properties of different materials to control the flow of heat energy. A variety of examples of how are identified and explained

“Making Clever Clothes” describes a number of technological innovations that provide solutions to challenges generated in the clothing and textile industries.

“Keeping Houses Warm or Cool” describes how, over time, house builders have used their knowledge of the properties of different materials and technological processes to control indoor temperatures. In this way, they can provide a comfortable living environment that is cool when the weather is hot and warm when the weather is cold. Materials suitable for insulating and the techniques used are described and explained.

“Investigating Insulation” introduces a science investigation in the form of a fair test to find out if different materials vary in their insulating properties. It describes a test that could be repeated by students or used as a model for testing the insulating properties of other materials.

“Heat Thieves” explores the effect of moving air on body temperature. It introduces wind-chill factors and provides a table that lists the changes of temperature as the wind speed increases. Water evaporation from the skin is also explored in a practical manner that could be modelled in the classroom. The article highlights the importance of developing an understanding of heat energy flow and how energy is used during the evaporation process.

Key ideas

Science

Nature of Science

- Scientists identify trends and patterns when exploring natural phenomena.
- Scientists use the trends and patterns to generate questions whose answers will help them create explanations and make sense of their observations.
- Scientists check their explanations by testing their evidence and sometimes repeating an investigation.

- Scientists record and share both their explanations and the processes they used to test their ideas with other scientists and with the general public, as well as using them to solve problems and needs.

Physical and Material Worlds

- Energy comes in many forms, one of which is heat energy.
- Heat energy is converted from other types of energy including the energy that is provided by food.
- Heat energy flows from where it is warmer to where it is cooler.
- What insulating materials are made of and where they are located influence the rate at which heat energy flows.
- Scientists and technologists use their knowledge of the physical and chemical properties of materials when seeking explanations and solutions to problems caused by changes in temperature.

Technology

- Technology involves people making “things” for an identified purpose.
- Technological outcomes have physical attributes and functional attributes.
- The physical attributes are related to the functional attributes (and vice versa). For example, Freddie’s clothes are light, making them easy to move in.
- Technological outcomes, such as clothing and housing, develop differently because of the environment they are designed and made for.
- Technological outcomes, such as clothing and housing, help people do things that would be difficult to do without the outcomes.

Mathematics

- Warm-blooded animals try to maintain a constant temperature. While the temperature outside may vary, our body tries to maintain a core temperature of 37 degrees Celsius.
- Temperature can be described and measured using comparisons or standard units and measuring devices. There are advantages to measuring temperature using a standard scale.
- Scientists and manufacturers use mathematical methods and skills to investigate variables such as insulating materials, and to determine which is the most appropriate for the situation.
- To find answers, they observe carefully, record what they observe, and organise their observations using charts and graphs.
- The temperature that we feel can be affected by many factors including the wind. Wind-chill and evaporative cooling can lower our body temperature.

- Scientists must be able to interpret multi-variable data tables in order to calculate things like insulating effect or wind-chill adjusted temperature.

***Connected* - the reading standards and the literacy learning progressions**

Your students are working towards the reading standards for after 3 years at school, or the end of year 4 or at the end of year 5.

The texts in *Connected 1 2010: Staying Warm, Keeping Cool* have been designed with characteristics that include many of the key characteristics of texts at Gold level:

- some unfamiliar contexts and settings
- a mix of explicit and implicit content within text and illustrations that requires students to make connections between ideas in the text and their prior knowledge in order to make simple inferences
- some unfamiliar words and phrases, the meaning of which is supported by the context, including subject-specific vocabulary
- visual language features such as subheadings, text boxes, footnotes, and diagrams and maps that are clearly explained and linked to the body text
- ideas and information organised in paragraphs
- a variety of sentence structures, including complex sentences.

From the reading standard for after three years at school

By the end of year 4 [year 5], students will read, respond to, and think critically about texts in order to meet the reading demands of the New Zealand curriculum at level 2 [towards level 3]. Students will locate and evaluate [and integrate] information and ideas within [and across a small range of] texts appropriate to this level as they generate and answer questions to meet specific learning purposes across the curriculum.

Reading standard, end of year 4 [5]

These texts also provide opportunities for students to :

- meet purposes for reading by employing specific comprehension strategies, such as:
 - identifying and summarising main ideas
 - making and justifying inferences
 - making connections between the text and prior knowledge
- work out the meanings of new words, using strategies such as :
 - applying knowledge of the meanings of most common prefixes
 - using reference sources to find the meanings of new words
 - inferring word meanings from known roots and affixes
- recognise the features and purposes of some common text types and use this knowledge to navigate and understand texts

- use visual language features to support their understanding of the ideas and information in the text.

The Literacy Learning Progressions, end of year 4

Students in year 5 can be expected to use their comprehension strategies and skills to demonstrate the above reading behaviours with greater independence.

The transition into year 5 brings with it a significant step up in terms of the demand for students to use their reading as an interactive tool for learning. Most of the texts that students are now required to read are instructional materials from across the curriculum. Students read in order to locate, evaluate, and integrate information and ideas within and across a small range of texts as they generate and answer questions to meet specific learning purposes across the curriculum.

The Literacy Learning Progressions (page 16)