Using the Nature of Science: Supporting Teaching and Learning

Developed from Astall, C. & Bruce, W. (2007). *Science Postcards: science exploration through stories.* www.sciencepostcards.com and Bruce, W. & Astall, C. (2009). *Thinking about the nature of science?* New Zealand Science Teacher, 122, 46.

'The **nature of science** strand is the overarching, unifying strand. Through it, students learn what science is and how scientists work. They develop the skills, attitudes, and values to build a foundation for understanding the world. They come to appreciate that while scientific knowledge is durable, it is also constantly re-evaluated in the light of new evidence. They learn how scientists carry out investigations, and they come to see science as a socially valuable knowledge system. They learn how science ideas are communicated and to make links between scientific knowledge and everyday decisions and actions.
These outcomes are pursued through the following major contexts in which scientific knowledge has developed and continues to develop.' New Zealand Curriculum (2007).

"...most students do not learn NOS implicitly, simply by doing science activities. Rather, the aspects of NOS you wish to emphasize need to be planned for and explicitly integrated into the lesson."
Lederman, G. N., & Lederman, S. J. (2004). Revising instruction to teach nature of science. *The Science Teacher*, 71(9), 36-39.

	Understanding about Science	Investigating in Science	Communicating in Science	Participating and contributing
Achievement Objectives Level 1 & 2	• Appreciate that scientists ask questions about our world that lead to investigations and that open-mindedness is important because there may be more than one explanation.	• Extend their experiences and personal explanations of the natural world through exploration, play, asking questions, and discussing simple models.	• Build their language and develop their understandings of the many ways the natural world can be represented.	• Explore and act on issues and questions that link their science learning to their daily living.
Achievement Objectives Level 3 & 4	• Appreciate that science is a way of explaining the world and that science knowledge changes over time. • Identify ways in which scientists work together and provide evidence to support their ideas.	• Build on prior experiences, working together to share and examine their own and others' knowledge. • Ask questions, find evidence, explore simple models, and carry out appropriate investigations to develop simple explanations.	• Begin to use a range of scientific symbols, conventions, and vocabulary. • Engage with a range of science texts and begin to question the purposes for which these texts are constructed.	• Use their growing science knowledge when considering issues of concern to them. • Explore various aspects of an issue and make decisions about possible actions
This could be...	☐ Knowing science knowledge is developed by different people ☐ Asking a variety of questions ☐ Being prepared to re-evaluate their science ideas ☐ Being open-minded ☐ Being honest ☐ Making careful observations ☐ Being aware science knowledge may change over time ☐ Understanding that science knowledge is a way of explaining our world ☐ Being aware of other cultures ☐ Using a variety of investigation methods to provide evidence to support their science ideas ☐ Using creative insight to aid explanation ☐ Discussing their ideas with others ☐ Having your science ideas challenged by other people ☐ Understanding that a lot of science knowledge has been built upon over a long time ☐ Being curious	☐ Being curious ☐ Making careful observations ☐ Asking questions ☐ Exploring their ideas ☐ Using a variety of investigative approaches: exploring, classifying and identifying, pattern seeking, fair testing, using models ☐ Planning an investigative approach to test out their science idea ☐ Gathering evidence to test their science idea ☐ Carrying out repeat tests during an investigation ☐ Understanding new knowledge generated is often new to the child ☐ Developing explanations based on evidence ☐ Discussing their ideas with others ☐ Being open-minded ☐ Being honest ☐ Using evidence to support their ideas ☐ Looking for trends and patterns in data ☐ Being creative	☐ Using scientific language ☐ Building their scientific vocabulary ☐ Being honest when communicating ☐ Having experience of a range of science text types ☐ Making predictions that are based upon their existing science knowledge ☐ Sharing explanations of experiences and observations ☐ Realising science explanations must withstand peer review before being accepted ☐ Using a variety of science texts (including symbols, graphs and diagrams) when explaining an idea ☐ Questioning the accuracy of science texts (e.g. data, graphs, diagrams) they are using ☐ Arguing a point of view ☐ Using a variety of media (e.g. oral, visual, text) to explain their ideas ☐ Questioning the validity of different science media (e.g. Internet videos, television programmes / adverts, movies) ☐ Using the 'passive' voice in reporting	☐ Being aware of science in their world ☐ Discussing issues of concern to them ☐ Asking questions as a result of a current event ☐ Understanding that investigations could be influenced by their communities ☐ Using argument to discuss different viewpoints of an issue ☐ Exploring ways of taking informed action ☐ Knowing science interacts with other cultures, globally ☐ Being aware of the needs of others ☐ Using their science knowledge when considering issues of concern to them ☐ Being open-minded when exploring aspects of an issue ☐ Making decisions based upon evidence ☐ Making responsible choices based on science knowledge ☐ Justifying an opinion based on their science knowledge ☐ Showing how science interacts within other curriculum areas ☐ Realising the relevance of science to their everyday life