A NEW TECHNOLOGICAL LITERACY

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ABSTRACT

The aim of technology education in New Zealand is to develop students' technological literacy. This was the aim of the *Technology in the New Zealand Curriculum* (1995) and remains the aim of the revised technology curriculum in *The New Zealand Curriculum* (2007). This paper explains the shifts that have occurred between the 1995 and 2007 curriculum in technology. It describes the three new strands and outlines how they contribute to an overall technological literacy. The paper also introduces a series of explanatory papers that have been developed to explain the strands and their components in more depth.

TECHNOLOGICAL LITERACY IN *Technology in the New Zealand Curriculum* (1995)

The aim of the *Technology in the New Zealand Curriculum* (1995) was to support the development of technological literacy as based on the three strands:

- Technological Knowledge and Understanding
- Technological Capability
- Technology and Society

These three strands needed to be brought together in all technology programmes to ensure students were provided with opportunities to undertake technological practice. Therefore, technological practice was seen as the vehicle through which students could develop their technological literacy. Technological areas were provided in the 1995 document as a means of providing teachers with a diverse range of contexts to draw from in the development of technology programmes, and to encourage that students develop literacy from a broad range of learning contexts.

Undertaking technological practice has been shown to provide students with the opportunity to collaborate with others and make a difference to their own lives and developments in their immediate community. This has resulted in high levels of student engagement and allowed students to take increasing ownership of their learning and feel empowered to make decisions regarding the nature of their outcomes.

However, after more than ten years of implementing the 1995 curriculum in schools from years 1-13, it has been noted that the nature of the technological literacy resulting from students undertaking technological practice alone, was often limited in breadth and depth. It was also often lacking the level of critical analysis required for more informed decision making in students' own practice and, in particular, making choices of a more general nature with regards to technology per se.

These findings led to a realisation that technological practice on its own was not enough. Research was then undertaken to identify what might be missing and address these gaps in the revised technology curriculum in *The New Zealand Curriculum* (2007)1.

1 For more details about this research please see papers by Compton and France 2007 available at www.iteaconnect.org/Conference/PATT/PATT18/fullprog-21a[1].pdf and Compton V.J and France B.J. (2007). Towards a New Technological Literacy: Curriculum Development with a Difference. In *Curriculum Matters 3*: 2007 158-175.Wellington: NZCER.

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TECHNOLOGICAL LITERACY IN *THE NEW ZEALAND CURRICULUM* (2007)

The research findings and subsequent curriculum development work resulted in technology education being restructured around three new strands:

- Technological Practice
- Nature of Technology
- Technological Knowledge

Classroom practice and research also raised issues around the inclusion of named technological areas. For example, the emphasis on technological areas often resulted in them being interpreted as discrete 'subjects', whereas learning in technology generally goes across a number of technological areas. More valuable contexts can be developed when these area are seen as more integrated. For this reason, the emphasis on technological areas has now been reduced and the requirement to cover four to six of the technological areas defined in the 1995 technology curriculum has been removed. This has been replaced by a more holistic framework to encourage learning programmes based on a broad range of contexts that draw from and cut across a variety of what may be termed technological areas. These areas reflect the communities of technological practice that exist within the technology sector.

A broad range of contexts should ensure coverage of the three types of transformations associated with technology. These are the transformation of energy, the transformation of information, and the transformation of materials. These transformations can in turn be categorised into four purposes – to manipulate, store, transport or control. It is also expected contexts chosen will allow students to experience and/or explore a range of historical and contemporary examples of technology to further encourage diversity within learning programmes.

This more holistic framework allows teachers to draw from a mix of contexts and develop learning programmes for students, to work towards the achievement objectives from all three strands, in a way that best suits the school resources, teacher knowledge and skill, and the interests of the students.

Each strand contributes to the 'whole' of technological literacy as explained below.

The Technological Practice strand enables students to undertake their own technological practice within a particular setting and to reflect on the technological practice of others. Within this strand students will develop their capability in terms of levelled achievement objectives derived from three key components of technological practice – Planning for Practice, Brief Development and Outcome Development and Evaluation.

Learning experiences focused on this strand will allow students to gain a sense of empowerment as they undertake their own technological practice to find solutions to identified needs and/or realise opportunities. This strand also provides opportunities to embed the philosophical ideas from the Nature of Technology and Technological Knowledge in order to better inform their practice. As such, the Technological Practice strand focuses student learning in technology around 'know how'.

The Nature of Technology strand provides students with an ability to develop a critical understanding of technology as an intervening force in the world, and that technological developments are inevitably influenced by historical, social and cultural events. Within this strand students will develop their philosophical view of technology in terms of levelled achievement objectives derived from two key components of the Nature of Technology - Characteristics of Technology and Characteristics of Technological Outcomes.

Learning experiences focused on this strand will provide opportunities for students to undertake informed debate about contentious issues and increase their understanding of the complex moral and ethical aspects that surround technology and technological developments. They will also provide an opportunity to examine the fitness for purpose of technological outcomes in the past and to make informed predictions about future technological directions at a societal and personal level. Such philosophical understandings are essential to the development of a broad and critical literacy for New Zealand students. As such, the Nature of Technology strand focuses student learning in technology around 'know why'.

The Technological Knowledge strand provides students with a basis for the development of key generic concepts underpinning technological development and resulting technological outcomes. These concepts allow students to understand evidence that is required to defend not only the feasibility of a technological outcome,

but also its desirability in a wider societal sense. Within this strand students will be able to develop technological understandings in terms of levelled achievement objectives derived from three key components of technological knowledge – Technological Modelling, Technological Products and Technological Systems.

Learning experiences focused on this strand will provide opportunities for students to explore functional modelling in order to understand simulated representations of reality as compared to the reality itself. This will allow them to fully appreciate both the power and limitations of functional modelling. Understanding the role and importance of functional modelling should reduce the propensity for students to take a 'build and fix' approach in their own technological practice. Exploring prototyping will provide students with a better sense of why prototyping is important, as well as how it can be undertaken to enhance any technological outcomes they may develop in their own technological practice. Knowledge of materials underpinning technological products, and the componentry and connections within technological systems, will enable students to infuse their technological practice with a higher level of technological understanding and support more informed material and/or componentry selection and manipulation in their decision making. As such, the Technological Knowledge strand focuses student learning in technology around 'know that'.

The three knowledge types, 'know how', 'know why' and 'know that', combine to provide students with all knowledge types seen as important in developing a sophisticated technological literacy.