

TECHNOLOGY AND VALUES

Initial discussion of the relationship

ABSTRACT

Values education is a clear focus of *The New Zealand Curriculum* (2007). The values section of the curriculum provides a direction for learning for all schools, to embed values in their school curriculum. This paper summarises key points from the values section of the curriculum and discusses how values education links with technology education. Examples are provided to illustrate these links.

VALUES EDUCATION IN NEW ZEALAND

Values are described in *The New Zealand Curriculum* (2007) as 'deeply held beliefs about what is important or desirable. They are expressed in the ways that people think and act'.

The curriculum suggests that all schools should encourage students to value:

- excellence
- innovation, enquiry and curiosity
- diversity
- equity
- community and participation for the common good
- ecological sustainability including care for the environment
- integrity
- respect for themselves, others and human rights

Teachers are encouraged to develop learning experiences that provide students with opportunities to learn about values and develop value-related capabilities.

Learning about values refers to students learning about:

- their own and others values
- different kinds of values such as moral, social, cultural, aesthetic and economic values
- those values upon which New Zealand's cultural and institutional traditions are based.

Developing value-related capabilities refers to students developing the ability to:

- express their own values
- explore the values of others
- critically analyse values and actions based on them
- discuss disagreements that arise from differences in values, and negotiate solutions
- make ethical decisions and act on them

THE RELATIONSHIP BETWEEN TECHNOLOGY AND VALUES EDUCATION

Technology, as an essential learning area, has a responsibility to work with all other learning areas, to ensure the intent of the values education section of the national curriculum is mediated into the classroom curriculum.

Technological literacy is at the heart of technology education and is both values laden and values dependent. This means that technological learning experiences can provide a natural and authentic site to embed values education, as the two are mutually enhancing. Examples of how values education intentions can be embedded within technology learning experiences are provided below. These are linked to each of the components of the technology strands.

THE COMPONENTS WITHIN THE TECHNOLOGICAL PRACTICE STRAND

Brief Development

This component allows students opportunity to understand the values of others, as they identify an authentic need or opportunity based on a comprehensive exploration and critical analysis of a context, associated issues, and a wide range of stakeholders' desires.

In defining specifications, students will be required to understand a range of different values in order to ensure that fitness for purpose is established in its broadest sense. Stakeholder values from the wider community will therefore need to be analysed and compared, and any areas of contestation identified and resolved. Through such analysis, the brief can be developed in a way that is acceptable to all key stakeholders and for those who may be impacted on, indirectly or in the future.

Having the opportunity to work with [students who were wheelchair bound](#) allowed a student to develop empathy for others as she came to appreciate specific challenges they face. Valuing the perspectives and values, alongside the physical requirements of her client group, was essential in developing a brief that guided the development of an outcome that was empowering for the client group and not merely functional.

Planning for Practice

This component necessitates that students have a strong focus on caring for the environment as they develop capability to manage resources efficiently, and make ethical decisions around sustainable development. Ongoing reflection and evaluation of past practice is critical to this component, ensuring the exploration of their own and others' values, and developing an understanding of how these values impact on decision-making. In order to work most effectively, ethically, and responsively, specific planning mechanisms need to be recognised as of value throughout the developmental work.

When planning [how to upgrade school toilets](#), students spent a lot of time exploring why their current toilets were not valued by the users, and in turn how misuse of them impacted on others' views. A key aspect of developing a successful plan was that of incorporating a focus on educating the users on the impact of their actions, on others and the environment.

Outcome Development and Evaluation

This component allows for a strong focus on students achieving excellence and showing perseverance in producing an outcome of worth. Not all technological practice results in technological outcomes. This component therefore allows for a range of creative and innovative ideas to be taken to various stages appropriate to the context. Such a focus allows student to arrive at a 'no go', decision when there is no defensible reason to use resources for a particular purpose.

Decisions underpinning the selection of particular outcomes for further development rely on extensive reflective and critical analysis of what is of value and why. This helps students to develop their capability in ethical decision making and acting, in accordance with these decisions. Exploration of materials in terms of functional and aesthetic value against environmental cost should be undertaken as extensively as possible, in order to interrogate designs and resourcing prior to the selection of materials and the development of any final outcome.

Outcomes, and the practice undertaken to develop them, should be critically reflected on and evaluated from a range of perspectives to ensure fitness for purpose. This in turn provides opportunities for students to explore stakeholder responses to outcomes, and to understand these in terms of the values that are embedded in them. Justification of decisions made will provide opportunity for students to clearly identify and articulate their own values and explain how these are reflected, or not, in other social groups.

The development of [souvenirs for the Te Papa store](#) provides a range of examples of how the students had to explore and understand a range of issues associated with values, in order to develop prototypes of souvenirs appropriate for their clients. Not only did they need to understand what was of value for New Zealanders, they also needed to understand the values of potential customers across a range of ages and cultures. Issues associated with economic worth and profit margins were also critical in the discernment and development of high quality but affordable souvenirs.

THE COMPONENTS WITHIN THE NATURE OF TECHNOLOGY STRAND

Characteristics of Technology

This component demands that students explore a range of different types of values. Analysing the history of technological development provides insight into the way that different values, as held by individuals as well as those that have been institutionalised, have influenced past technological decision making, and how these in turn impact on the values of others.

The [growth of Living Nature](#), as a commercial entity in New Zealand, and the influences on the specific products developed by this company, can be analysed in this way. It provides clear examples of how technological decision making brings together personal values and serves to reflect, and possibly change, the values held by others with respect to personal care and care for the environment.

This component also provides opportunities for informed debate of contentious issues concerned with technology, and the complex moral and ethical aspects involved in taking a particular position. The influences behind past technological developments can be explored and analysed to develop understandings of issues of diversity, equity, and respect for others.

Looking at examples from the past, where such issues have been ignored as well as when they have been addressed, allows students to more clearly identify the importance of these issues in contemporary society. Clashes between indigenous people and colonising forces provide a number of examples of past and contemporary contentious issues. One of these is the devaluing of indigenous knowledge and customs, particularly in regards to imposed technologies.

Exploring technological developments in the area of medicine allows students to explore how people's different religious, cultural and environmental values interact in complex ways, resulting in negative outcomes for some groups. It also allows for an exploration of how benefits can be derived for all if a more consultative and informed approach is taken, whereby alternative views and values are afforded respect.

The Gift of Rongoa (Learning Media Applications edition published in 2005) provides a good starting point for such discussions.

Characteristics of Technological Outcomes

This component provides opportunity to examine the fitness for purpose of technological outcomes in the past, and to make informed predictions about future technological directions, based on social and personal values, and potential technological advancements.

Interpreting technological outcomes relies on an ability to identify the purpose for the outcome, and the values that underpinned its development and continued presence. Examining a range of historical, contemporary and potential future technological outcomes provides opportunities for students to interrogate notions of what is valued as being fit for purpose across people, time and place. It also allows for a critical review of the fitness of any purpose, and how this may change as the values of both designers and users evolve over time and place.

The History Makers (Learning Media Applications edition published in 2007) discusses examples of the way things are valued differently across time, and how different social and cultural values can influence what is seen as appropriate in contemporary situations.

THE COMPONENTS WITHIN THE TECHNOLOGICAL KNOWLEDGE STRAND

Technological Modelling

This component provides opportunity to recognise and value both functional and practical reasoning. Understanding the role of all types of values, in determining whether any development should progress, is critical. A decision may be made to terminate a development in the short or long term, to continue as planned, or to change/refine a design concept or technological outcome. This can be analysed against the values of different people, groups and institutions, and the value of the arguments put forward as to the ethical nature of the actions taken.

In the context of designing and developing high quality models of a cell phone to communicate their design ideas, students were faced with a range of ethical issues associated with working with a client and designing for a fickle teenage market. Environmental impacts of material selection, use and disposal were all important values issues associated with this work, as were cost effectiveness when designing a commercially viable product.

Technological Products

This component allows for an in-depth exploration of the materials used in a particular product and their perceived value to the designer and user. Appropriate material development and use can be analysed with regards to the values of stakeholders. The opportunity to analyse material use and development in terms of product life cycles allows for students to explore values associated with sustainability, and the way caring for the environment is considered a worthy value, or not, by different stakeholders.

In the context of developing new materials for use in a 'Kiwi Made' unit, environmental, social and ethical issues naturally arose as the unit progressed. Students were able to explore the fitness for purpose of past materials, in terms of values associated with care of the environment and animals and those associated with wearing animal based materials. They also considered the values inherent in the concept of 'being in fashion' generally, and were required to identify what New Zealanders value, and how and why this has changed from the past, and may change in the future.

Technological Systems

This component provides opportunity for students to explore how system development can be deemed appropriate and how acceptable it is to integrate technological systems with other systems – for example, robotic technologies integrated into human physiological systems.

Understanding the values associated with a wide range of stakeholders, and how they prioritise their own and others' needs when taking positions on such issues, allows students to explore their own reactions in a more informed manner.

Redundancy and reliability within technological system design and performance can be critiqued, in terms of how they are perceived by people and evaluated in terms of risk acceptability.

Exploring the use of black boxes, when working with technological systems, provides opportunity for students to understand the advantages and disadvantages of black boxing system components. For example, understanding the possible advantages of using a black box approach to gain a holistic understanding of a complex system, versus the possible disadvantages for the end-user should the system malfunction.

Understanding how the components of a technological system work together was imperative when modifying a [grabbing tool for a disabled client](#). Exploring the specific needs of the client allowed the student to prioritise the factors that were of most value to the client, and thereby ensure the final outcome was valued by the client as a 'third arm' rather than a frustrating tool.